Environmental Chemical Corporation

Li Tungsten

STANDARD LEVEL IV
REPORT OF ANALYSIS

WORK ORDER #07-07017-OR

July 19, 2007

EBERLINE SERVICES/OAK RIDGE LABORATORY
OAK RIDGE, TN

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Eberline Services – Oak Ridge Laboratory

LABORATORY DATA SUPPORT CHECKLIST

MP-001-3

Eberline Services Work Order # 07.07017

The checklist items listed below are to be initialed by appropriate staff upon completion/verification.

Date for Partial	Initials	Date	Initials	Checklist Items
		7-5-07	DD	Sample Log-In
		7/13/07	KBS	Data Compilation
		7-16-07	MLT	Technical Data Review MJM 7/16/07
		7/19/07	DB	Data Entry/Electronic Deliverable
		7/19/07	DB	Case Narrative
		7/19/07	KBS	Electronic Deliverable Proof
		7/19/07	CJH	Samples Analyzed within Holding Time Y/ES
		7/19/07	CJH	QA/QC Review
				Invoiced by Laboratory

Technical/Clerical Corrections, Signatures Needed, Problems,Etc	Date/Initials

Date package approved by: _____ 7/19/07

Laboratory Manager Date

SECTION I

CHAIN OF CUSTODY

07.07017

Environmental Chemical Corporation
1746 Cole Blvd.
Bldg. 21, Suite 350
Lakewood, CO 80401
Phone: (303) 298-7607
Fax: (303) 298-7837

COC Number:

Customer Name: ECC – LI Tungsten
Address: 63 Herb Hill Road, Glen Cove, NY 11542

EBERLIN

Contact: Theodore Johnson
Phone: (303) 472 - 8834
Fax: (516) 665- 8531

ECC Project Manager: Phil O'Dwyer
Address: 63 Herb Hill Road, Glen Cove, NY 11542

Phone: (614) 402 - 2020
Customer Project Name: Li Tungsten

SAMPLE NUMBER	DATE	TIME	TYPE	CLIENT SAMPLE IDENTIFIER	TESTS	CONTAINER(S)	MATRIX
4 5601-FSS-SU3-1014	5/25/2007	9:45	FSS	Parcel C	Ra-226/Ra-228, Iso-Th, Iso-U	1 Gallon Pl Bag	Soil
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							

RECEIVED
JUL 05 2007
BY

Notes:
Ship to: Eberline Laboratory, Tenn
601 Scarboro Rd, Oak Ridge, TN, 37830
Phone: 865-481-0683
Request Turnaround Time: 7 Day 28-day per Ted Johnson 7/5/07

7-3-07 JDJ ~~Samples cooled below 4 C~~

Laboratory Receipt Information
Cooler/Container Intact? Yes____ No____
Samples Received At Below 4 C? Yes____ No____
Samples Containers Intact? Yes____ No____
Cooler/Container Custody Seal? Yes____ No____

CUSTODY TRANSFER RECORD

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Print:Ted Johnson Sign: TJ	ECC	7/3/2007		Print: Dwayne Pino	Eberline Service	7-5-07	0930
Print:				Print:			
Print:				Print:			

55
55

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	07-07017
Lab Deadline	7/26/2007
Analysis	UUISO - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	49	L1.2

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-5-07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-6-07
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7/6/07 0800
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7/9/07 0800
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1530	7/9/07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-12-07 0709
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-12-07 0800
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-12-07 1217
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	07-07017
Lab Deadline	7/26/2007
Analysis	ThISO - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	49	L1.2

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-5-07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-6-07
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7/6/07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7/9/07 1000
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	LW 1530	7/9/07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7.12.07 0730
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7.12.07 0830
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-12-07 16:00
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	07-07017
Lab Deadline	7/26/2007
Analysis	Ra226 - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	49	L1.2

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 11:00AM	Rachelle	7-5-07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 9:00AM	Rachelle	7-6-07
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7/9/07 0900
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7/9/07 1200
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1200		7/9/07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1315		7/10/07
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-10-07 13:15
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-10-07 20130
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

EBERLINE SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	07-07017
Lab Deadline	7/26/2007
Analysis	Ra228 - Level 4
Sample Matrix	Soil/Solid

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	49	L1.2

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1100AM	Pachelli	7-5-07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 900AM	Pachelli	7-6-07
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JR	7/6/07 0900
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JR	7/9/07 420
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1200	DT	7/9/07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 1315	DT	7/10/07
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JRt	7-10-07 1315
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JRt	7-10-07 2030
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room 0600	DT	7/11/07
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room 0940	DT	7/13/07
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7-13-07 0842
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7/13/07 1330
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

SECTION II

SAMPLE ACKNOWLEDGEMENT

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
Environmental Chemical Corporation	5601.000.ES	Environmental	07/05/2007	28	07-07017
Project Name	**Client WO**	**Sample Disp**	**Lab Deadline**	**Internal Deadline**	**Client Deadline**
Li Tungsten	Li Tungsten	H	07/26/2007	07/30/2007	07/30/2007

Internal ID	Client ID	Sample Date	Matrix	Storage	Ra226	Ra228	ThISO	UUISO																					Ttl
01	LCS	07/05/07	SO	L1.2	X	X	X	X																					4
02	BLANK	07/05/07	SO	L1.2	X	X	X	X																					4
03	DUP	07/05/07	SO	L1.2	X	X	X	X																					4
04	5601-FSS-SU3-1014	05/25/07 09:45	SO	L1.2	X	X	X	X																					4
																													0
																													0
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																													0
																													0
																													0
Totals Per Analysis (non QA samples)					1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

EBERLINE SERVICES

Sample Log In Report

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830

Voice: (865) 481-0683
Fax: (865) 483-4621

Invoice		Report Data	
	Accounts Payable		Ted Johnson
	Environmental Chemical Corporation		Li Tungsten Superfund Site
	1125 Route 22 West, #310		63 Herb Hill Road
	Bridgewater, NJ 08801		Glen Cove, NY 11542
Voice	908-595-1777	Voice	303-472-8834
Fax	908-595-1776	Fax	
Contact	Ted Johnson	**eMail datat to Ted Johnson**	
Voice	303-472-8834		
Fax			

Printed: 7/5/2007 11:33 AM

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 07.07017

SAMPLE MATRIX/MATRICES:

(CIRCLE ONE OR BOTH)

AQUEOUS NON-AQUEOUS

(CIRCLE EITHER YES, NO, OR N/A)

WERE SAMPLES:

Received in good condition?	Y	N	
If aqueous, properly preserved	Y	N	N/A

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	Y	N
Unbroken on outside of package?	Y	N
Present on samples?	Y	N
Unbroken on samples?	Y	N
Was chain of custody present upon sample receipt?	Y	N

IF THE RESPONSE TO ANY OF THE ABOVE IS **NO**, A DISCREPANT SAMPLE RECEIPT REPORT (DSR) HAS BEEN ISSUED.

REMARKS: _____

SIGNATURE: _____ DATE: 7-5-07

SECTION III

CASE NARRATIVE

EBERLINE SERVICES

Oak Ridge Laboratory
601 Scarboro Road
Oak Ridge, TN 37830
Phone (865) 481-0683
Fax (865) 483-4621

EBS-OR-26044

July 19, 2007

Ted Johnson
Environmental Chemical Corporation
63 Herb Hill Road
Glen Cove, NY 11542

CASE NARRATIVE
Work Order # 07-07017-OR

SAMPLE RECEIPT

This work order contains one soil sample received 7/5/2007. This sample was analyzed for Radium-226/228, Isotopic Thorium and Isotopic Uranium.

CLIENT ID	LAB ID
5601-FSS-SU3-1014	07-07017-04

ANALYTICAL METHODS

Radium-226 was analyzed using EPA Method 903.0 Modified. Radium-228 was analyzed using EPA Method 904.0 Modified. Isotopic Thorium was analyzed using Method EML Th-01 Modified. Isotopic Uranium was analyzed using Method EML U-02 Modified.

ANALYTICAL RESULTS

Combined Standard uncertainty is reported at 1-sigma value.

Method Detection Limits (MDA's) reflected on the Preliminary Data Report (PDR) are calculated using the equation from ANSI N13.30 (see below) for different blank and sample counting times. The MDA calculation used by the alpha spectroscopy software assumes an equal count time for the sample and background, and may be therefore slightly different than the MDA reflected on the PDR.

ANSI 13.30 $$MDA = \frac{3.29\sqrt{R_b T_g \left(1+\frac{T_g}{T_b}\right)} + 3}{K T_g}$$

Where:
R_b = Background Count Rate
T_g = Count Time of Sample
T_b = Background Count Time
K = Calibration and Calculation Factors in Appropriate Units

ISOTOPIC URANIUM

Sample was prepared by removing a representative aliquot from the sample followed by mixed acid digestions as appropriate. Uranium was selectively extracted by ion exchange. Uranium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using energy specific regions of interest for Uranium-234, Uranium-235 and Uranium-238. Chemical recovery was determined by the use of a Uranium-232 tracer. Activity of the Uranium-232 tracer was determined by alpha spectroscopy using an energy specific region of interest.

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ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM continued

Sample demonstrated background equivalent results for Uranium-234, Uranium-235 and Uranium-238 activity. Chemical recovery was acceptable for all samples. Results for the Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated background or non-detect equivalent activity. Results for the Uranium-234 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-235 replicate demonstrated a high relative percent difference and normalized difference. Uranium-235 replicate results are statistically equivalent with consideration of the ±2-sigma counting uncertainties. Results for the Uranium-238 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-234, Uranium-235 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

ISOTOPIC THORIUM

Sample was prepared by removing a representative aliquot from the sample followed by mixed acid digestions as appropriate. Thorium was selectively extracted by ion exchange. Thorium was eluted, micro-precipitated and mounted on micro-porous filter media. Sample activities were then determined by alpha spectroscopy using energy specific regions of interest for Thorium-228, Thorium-230 and Thorium-232. Chemical recovery was determined by the use of a Thorium-229 tracer. Activity of the Thorium-229 tracer was determined by alpha spectroscopy using an energy specific region of interest.

Sample demonstrated slightly positive results for Thorium-228, Thorium-230 and Thorium-232 activity. Chemical recovery was acceptable for all samples. Results for the Thorium-228, Thorium-230 and Thorium-232 method blank demonstrated background equivalent activity. Results for the Thorium-228 and Thorium-230 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Thorium-232 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Thorium-228, Thorium-230 and Thorium-232 laboratory control sample demonstrated an acceptable percent recovery.

RADIUM-226

Sample was prepared by removing a representative aliquot from the sample followed by mixed acid digestions as appropriate. This was followed by selective sulfate precipitations of the Radium. Samples were then mounted by semi-micro-precipitations onto micro-porous filters. Samples were counted by alpha spectroscopy using an energy specific region of interest for Radium-226. Chemical recovery was calculated by the use of a Barium-133 tracer, which was determined by HPGe gamma spectroscopy.

Sample demonstrated slightly positive results for Radium-226 activity. Chemical recovery was acceptable for all samples. Results for the Radium-226 method blank demonstrated background equivalent activity. Results for the Radium-226 replicate demonstrated a slightly high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-226 laboratory control sample demonstrated an acceptable percent recovery.

RADIUM-228

Following alpha spectroscopy analysis of Radium-226, Barium/Radium Sulfate precipitate was redissolved and allowed for sufficient ingrowth of the Actinium-228 daughter. After ingrowth, Actinium-228 was selectively precipitated. Precipitate was filtered and Actinium-228 beta emissions were then

ANALYTICAL RESULTS CONTINUED

RADIUM-228 continued

counted on a gas proportional counter. Chemical recovery was determined by the use of a Barium-133 tracer, of which each sample activity was determined by HPGe gamma spectroscopy and an elemental Yttrium carrier by gravimetric measurements. The product of these two recoveries was used to calculate chemical yield.

Sample demonstrated background equivalent results for Radium-228 activity. Chemical recovery was acceptable for all samples. Results for the Radium-228 method blank demonstrated background equivalent activity. Results for the Radium-228 replicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.

M.R. McDougall
Laboratory Manager

Date: 7/19/2007

SECTION IV

ANALYTICAL RESULTS SUMMARY

Eberline Services
Final Report of Analysis

Report To:	Work Order Details:	
Ted Johnson	SDG:	07-07017
Li Tungsten Superfund Site	Purchase Order:	5601.000.ES
63 Herb Hill Road	Analysis Category:	ENVIRONMENTAL
Glen Cove, NY 11542	Sample Matrix:	SO

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
07-07017-01	LCS	KNOWN	07/05/07 00:00	7/5/2007	7/10/2007	07-07017	Radium-226	EPA 903.0 Modified	1.01E+01	4.66E-01			pCi/g
07-07017-01	LCS	SPIKE	07/05/07 00:00	7/5/2007	7/10/2007	07-07017	Radium-226	EPA 903.0 Modified	1.06E+01	1.39E+00	7.10E-01	2.16E-01	pCi/g
07-07017-02	MBL	BLANK	07/05/07 00:00	7/5/2007	7/10/2007	07-07017	Radium-226	EPA 903.0 Modified	5.14E-02	1.01E-01	5.14E-02	2.87E-01	pCi/g
07-07017-03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/10/2007	07-07017	Radium-226	EPA 903.0 Modified	7.71E-01	2.92E-01	1.49E-01	2.41E-01	pCi/g
07-07017-04	DO	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/10/2007	07-07017	Radium-226	EPA 903.0 Modified	1.01E+00	3.31E-01	1.69E-01	2.21E-01	pCi/g
07-07017-01	LCS	KNOWN	07/05/07 00:00	7/5/2007	7/13/2007	07-07017	Radium-228	EPA 904.0 Modified	3.79E+01	1.71E+00			pCi/g
07-07017-01	LCS	SPIKE	07/05/07 00:00	7/5/2007	7/13/2007	07-07017	Radium-228	EPA 904.0 Modified	3.30E+01	1.13E+00	1.18E+00	1.03E+00	pCi/g
07-07017-02	MBL	BLANK	07/05/07 00:00	7/5/2007	7/13/2007	07-07017	Radium-228	EPA 904.0 Modified	3.44E-01	4.42E-01	2.26E-01	1.04E+00	pCi/g
07-07017-03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/13/2007	07-07017	Radium-228	EPA 904.0 Modified	3.23E-01	3.89E-01	1.99E-01	9.17E-01	pCi/g
07-07017-04	DO	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/13/2007	07-07017	Radium-228	EPA 904.0 Modified	6.29E-01	3.28E-01	1.69E-01	7.35E-01	pCi/g
07-07017-01	LCS	KNOWN	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Thorium-228	EML Th-01 Modified	4.76E+00	1.71E-01			pCi/g
07-07017-01	LCS	SPIKE	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Thorium-228	EML Th-01 Modified	4.97E+00	1.14E+00	5.82E-01	1.40E-01	pCi/g
07-07017-02	MBL	BLANK	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Thorium-228	EML Th-01 Modified	1.23E-01	1.36E-01	6.93E-02	2.16E-01	pCi/g
07-07017-03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Thorium-228	EML Th-01 Modified	7.57E-01	2.87E-01	1.46E-01	1.67E-01	pCi/g
07-07017-04	DO	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Thorium-228	EML Th-01 Modified	8.69E-01	2.99E-01	1.53E-01	1.16E-01	pCi/g
07-07017-01	LCS	KNOWN	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Thorium-230	EML Th-01 Modified	5.32E+00	1.44E-01			pCi/g
07-07017-01	LCS	SPIKE	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Thorium-230	EML Th-01 Modified	5.41E+00	1.23E+00	6.26E-01	1.01E-01	pCi/g
07-07017-02	MBL	BLANK	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Thorium-230	EML Th-01 Modified	1.46E-01	1.36E-01	6.92E-02	1.60E-01	pCi/g
07-07017-03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Thorium-230	EML Th-01 Modified	8.56E-01	3.01E-01	1.54E-01	1.02E-01	pCi/g
07-07017-04	DO	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Thorium-230	EML Th-01 Modified	7.90E-01	2.75E-01	1.40E-01	9.44E-02	pCi/g
07-07017-01	LCS	KNOWN	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Thorium-232	EML Th-01 Modified	4.76E+00	1.71E-01			pCi/g
07-07017-01	LCS	SPIKE	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Thorium-232	EML Th-01 Modified	5.34E+00	1.21E+00	6.18E-01	1.01E-01	pCi/g
07-07017-02	MBL	BLANK	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Thorium-232	EML Th-01 Modified	3.95E-02	7.72E-02	3.94E-02	1.60E-01	pCi/g
07-07017-03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Thorium-232	EML Th-01 Modified	6.03E-01	2.39E-01	1.22E-01	9.17E-02	pCi/g
07-07017-04	DO	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Thorium-232	EML Th-01 Modified	8.43E-01	2.86E-01	1.46E-01	4.23E-02	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

EBERLINE SERVICES

Oak Ridge Laboratory

601 Scarboro Road, Oak Ridge, TN 37830 865/481-0683 FAX 865/483-4621

Eberline Services
Final Report of Analysis

Report To:	Work Order Details:	
Ted Johnson	SDG:	07-07017
Li Tungsten Superfund Site	Purchase Order:	5601.000.ES
63 Herb Hill Road	Analysis Category:	ENVIRONMENTAL
Glen Cove, NY 11542	Sample Matrix:	SO

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
07-07017-01	LCS	KNOWN	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Uranium-234	EML U-02 Modified	8.22E+00	2.96E-01			pCi/g
07-07017-01	LCS	SPIKE	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Uranium-234	EML U-02 Modified	7.63E+00	1.29E+00	6.58E-01	6.30E-02	pCi/g
07-07017-02	MBL	BLANK	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Uranium-234	EML U-02 Modified	1.04E-01	7.41E-02	3.78E-02	6.54E-02	pCi/g
07-07017-03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Uranium-234	EML U-02 Modified	6.08E-01	1.82E-01	9.27E-02	4.78E-02	pCi/g
07-07017-04	DO	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Uranium-234	EML U-02 Modified	5.82E-01	1.83E-01	9.36E-02	7.80E-02	pCi/g
07-07017-01	LCS	KNOWN	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Uranium-235	EML U-02 Modified	3.73E-01	1.34E-02			pCi/g
07-07017-01	LCS	SPIKE	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Uranium-235	EML U-02 Modified	3.36E-01	1.58E-01	8.07E-02	4.55E-02	pCi/g
07-07017-02	MBL	BLANK	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Uranium-235	EML U-02 Modified	2.98E-02	4.23E-02	2.16E-02	4.03E-02	pCi/g
07-07017-03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Uranium-235	EML U-02 Modified	1.90E-02	3.69E-02	1.88E-02	7.69E-02	pCi/g
07-07017-04	DO	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Uranium-235	EML U-02 Modified	1.10E-01	7.95E-02	4.06E-02	3.73E-02	pCi/g
07-07017-01	LCS	KNOWN	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Uranium-238	EML U-02 Modified	8.02E+00	2.89E-01			pCi/g
07-07017-01	LCS	SPIKE	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Uranium-238	EML U-02 Modified	7.78E+00	1.31E+00	6.70E-01	6.28E-02	pCi/g
07-07017-02	MBL	BLANK	07/05/07 00:00	7/5/2007	7/12/2007	07-07017	Uranium-238	EML U-02 Modified	9.40E-02	6.94E-02	3.54E-02	5.56E-02	pCi/g
07-07017-03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Uranium-238	EML U-02 Modified	5.97E-01	1.79E-01	9.14E-02	2.79E-02	pCi/g
07-07017-04	DO	5601-FSS-SU3-1014	05/25/07 09:45	7/5/2007	7/12/2007	07-07017	Uranium-238	EML U-02 Modified	7.70E-01	2.17E-01	1.11E-01	7.27E-02	pCi/g

CU=Counting Uncertainty;CSU=Combined Standard Uncertainty (1-sigma);MDA=Minimal Detected Activity;LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original

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SECTION V

QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
07-07017	UUISO	1	pCi	g	Environmental Chemical Corporation

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
U-234	1.71	92.73%	8.64%	100.00%	3.60%	8.22E+00	2.96E-01	7.63E+00	6.58E-01	U-8a	3.52E+01	3.60E+00	5.18E-01
U-235	0.90	90.00%	24.01%	100.00%	3.60%	3.73E-01	1.34E-02	3.36E-01	8.07E-02	U-8a	1.60E+00	3.60E+00	5.18E-01
U-238	0.66	97.09%	8.61%	100.00%	3.60%	8.02E+00	2.89E-01	7.78E+00	6.70E-01	U-8a	3.44E+01	3.60E+00	5.18E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

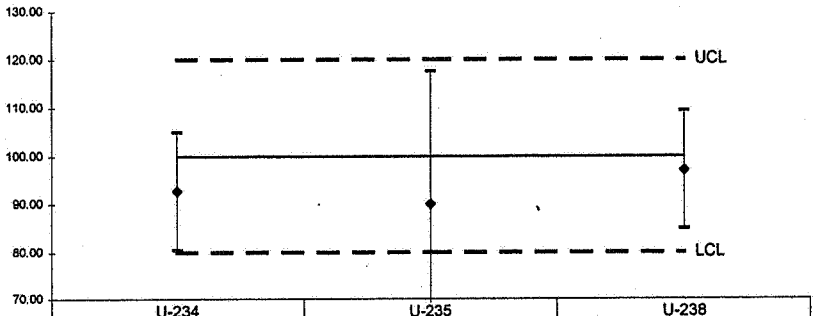
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
U-234	0.39	4.44	5.82E-01	9.36E-02	6.08E-01	9.27E-02
U-235	3.99	141.13	1.10E-01	4.06E-02	1.90E-02	1.88E-02
U-238	2.36	25.30	7.70E-01	1.11E-01	5.97E-01	9.14E-02

QC Summary

LCS Relative Bias	*LCS % R*	*LCS ND*	*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
0.93	OK	OK			OK	OK
0.90	OK	OK			INV	INV
0.97	OK	OK			INV	OK

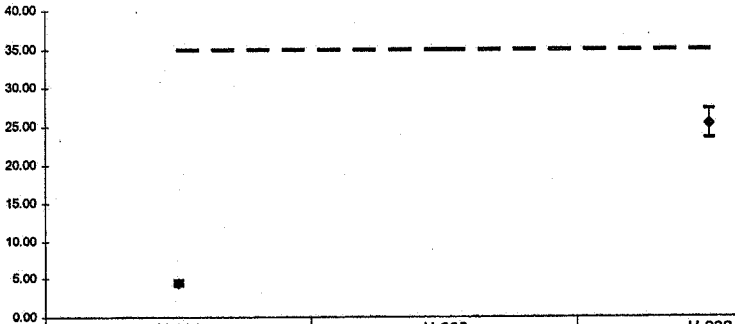
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
07-07017	UUISO	1	pCi	g	Environmental Chemical Corporation

LCS % Recovery



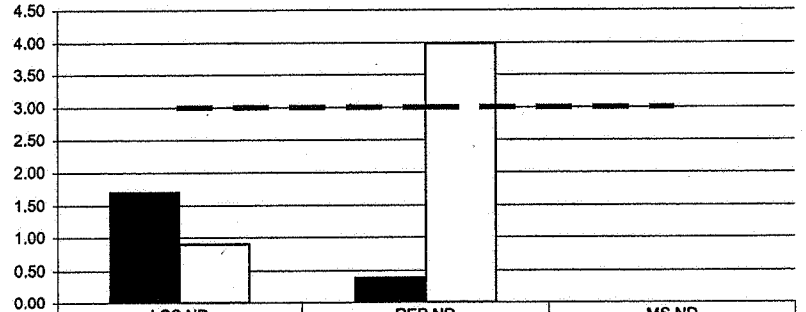
	U-234	U-235	U-238
Lower Error	80.50	62.39	84.89
Upper Error	104.97	117.61	109.30
%R	92.73	90.00	97.09
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	U-234	U-235	U-238
Lower Error	4.79	173.60	27.17
Upper Error	4.09	108.66	23.43
RPD	4.44	141.13	25.30
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
U-234	1.71	0.39	0.00
U-235	0.90	3.99	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
07-07017	ThISO	1	pCi	g	Environmental Chemical Corporation

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
TH-228	0.70	104.43%	11.70%	100.00%	3.60%	4.76E+00	1.71E-01	4.97E+00	5.82E-01	Th-8b	1.04E+02	3.60E+00	1.02E-01
TH-230	0.29	101.73%	11.58%	100.00%	2.70%	5.32E+00	1.44E-01	5.41E+00	6.26E-01	Th-1b	2.35E+01	2.70E+00	5.02E-01
TH-232	1.79	112.06%	11.59%	100.00%	3.60%	4.76E+00	1.71E-01	5.34E+00	6.18E-01	Th-8b	1.04E+02	3.60E+00	1.02E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

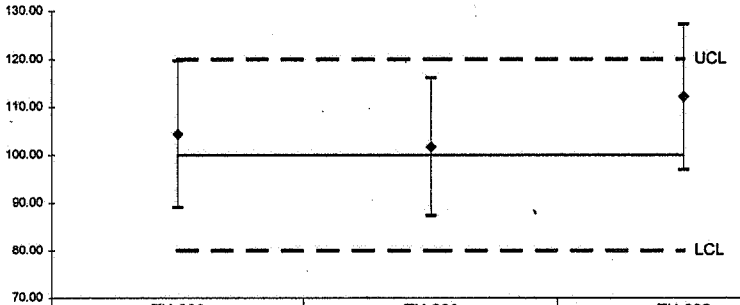
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
TH-228	1.04	13.78	8.69E-01	1.53E-01	7.57E-01	1.46E-01
TH-230	0.62	7.96	7.90E-01	1.40E-01	8.56E-01	1.54E-01
TH-232	2.47	33.23	8.43E-01	1.46E-01	6.03E-01	1.22E-01

QC Summary

LCS Relative Bias	*LCS % R*	*LCS ND*	*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.04	OK	OK			OK	OK
1.02	OK	OK			OK	OK
1.12	OK	OK			INV	OK

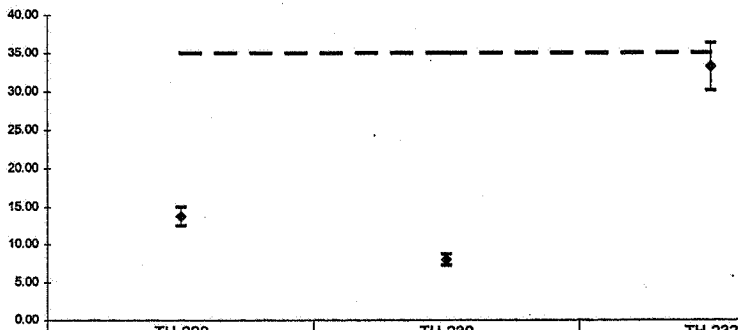
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
07-07017	ThISO	1	pCi	g	Environmental Chemical Corporation

LCS % Recovery



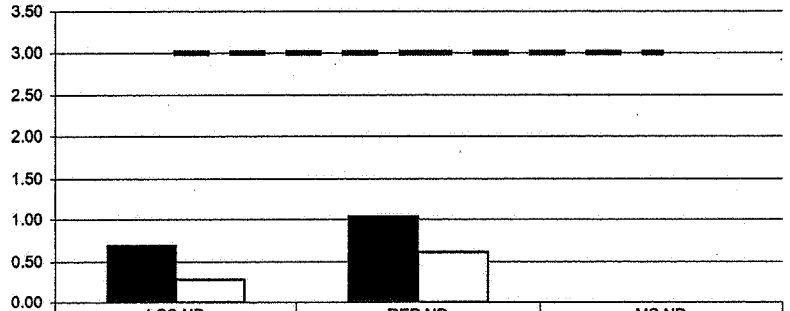
	TH-228	TH-230	TH-232
Lower Error	89.14	87.46	96.87
Upper Error	119.73	116.01	127.24
%R	104.43	101.73	112.06
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	15.05	8.67	36.31
Upper Error	12.51	7.25	30.14
RPD	13.78	7.96	33.23
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	0.70	1.04	0.00
TH-230	0.29	0.62	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
07-07017	Ra226	1	pCi	g	Environmental Chemical Corporation

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-226	1.07	104.15%	6.73%	100.00%	4.60%	1.01E+01	4.66E-01	1.06E+01	7.10E-01	Ra-5b	4.42E+01	4.60E+00	5.09E-01

Matrix Spike

Analyte	*Normalized Difference*	*MS Actual % Rec*	*Expected MS Result*	*Expected MS Uncert*	*Actual MS Result*	*Actual MS CSU*	*Sample Result*	*Sample CSU*	*Sample Aliquot*	*Standard ID*	*Standard ACT (dpm)*	*Standard Error %*	*Standard Added (g)*

Replicate Sample

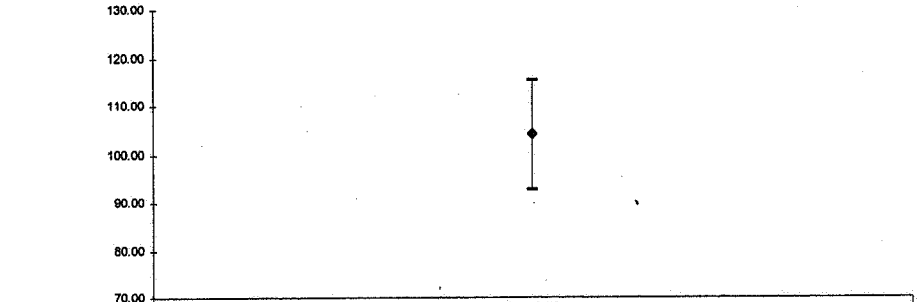
Analyte	*Normalized Difference*	*RPD*	*Original Result*	*Original CSU*	*Replicate Result*	*Replicate CSU*
RA-226	2.12	27.29	1.01E+00	1.69E-01	7.71E-01	1.49E-01

QC Summary

LCS Relative Bias	*LCS % R*	*LCS ND*	*MS % R*	*MS ND*	*Rep RPD*	*Rep ND*
1.04	OK	OK			INV	OK

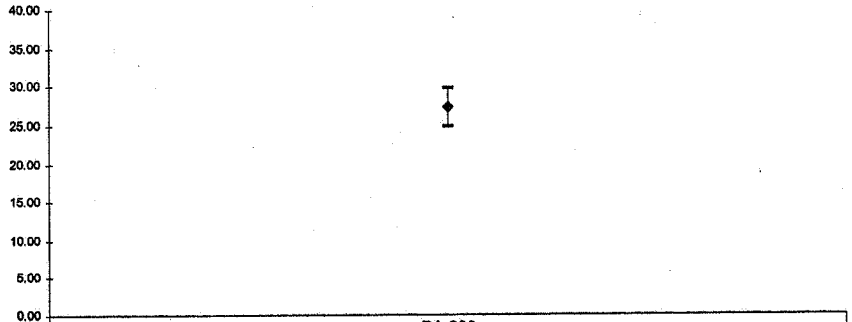
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
07-07017	Ra226	1	pCi	g	Environmental Chemical Corporation

LCS % Recovery



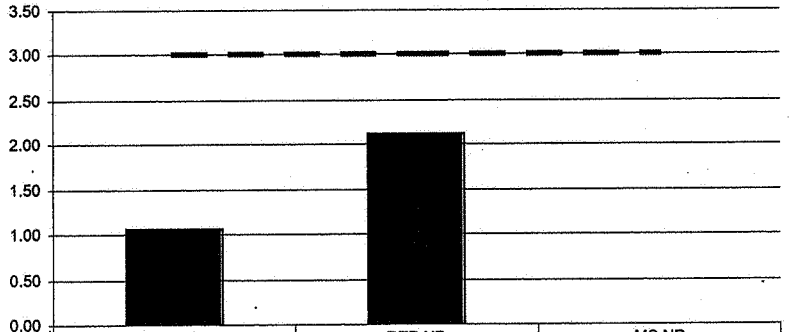
	RA-226
Lower Error	92.81
Upper Error	115.48
%R	104.15
LCL	80
Mean	100
UCL	120

Replicate Sample RPD



	RA-226
Lower Error	29.72
Upper Error	24.86
RPD	27.29
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-226	1.07	2.12	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
07-07017	Ra228	1	pCi	g	Environmental Chemical Corporation

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	5.88	87.14%	3.58%	100.00%	4.50%	3.79E+01	1.71E+00	3.30E+01	1.18E+00	Ra-10	1.03E+02	4.50E+00	8.16E-01

Matrix Spike

Analyte	Normalized Difference	MS Actual % Rec	Expected MS Result	Expected MS Uncert	Actual MS Result	Actual MS CSU	Sample Result	Sample CSU	Sample Aliquot	Standard ID	Standard ACT (dpm)	Standard Error %	Standard Added (g)

Replicate Sample

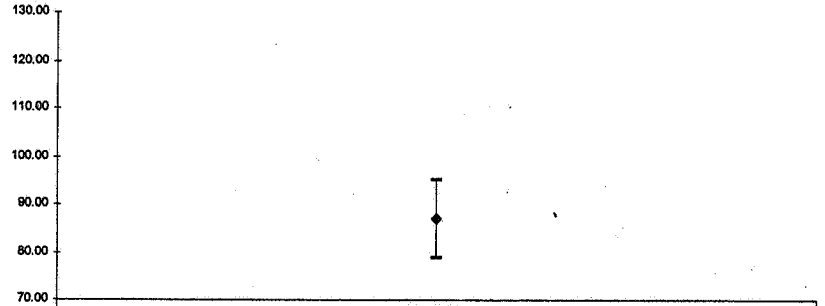
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU
RA-228	2.30	64.29	6.29E-01	1.69E-01	3.23E-01	1.99E-01

QC Summary

LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
0.87	OK	INV			INV	OK

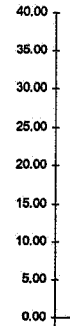
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
07-07017	Ra228	1	pCi	g	Environmental Chemical Corporation

LCS % Recovery



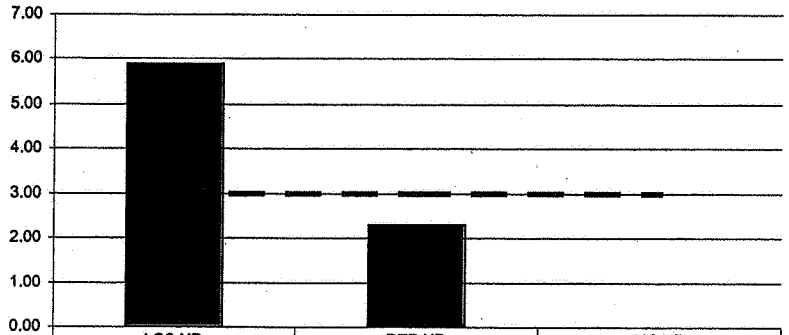
	RA-228
Lower Error	79.06
Upper Error	95.22
%R	87.14
LCL	80
Mean	100
UCL	120

Replicate Sample RPD



	RA-228
Lower Error	76.70
Upper Error	51.88
RPD	64.29
CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
RA-228	5.88	2.30	0.00
UCL	3	3	3

No Matrix Spike

SECTION VI

LABORATORY TECHNICIAN'S NOTES

ISO-U NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	07-07017
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	07/06/07 09:14	PREP	JBARNARD	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN UNTIL NEAR DRY- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS

7/6/07

EBERLINE SERVICES

Work Order Analysis Notes

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Oak Ridge, TN 37830
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www.eberlineservices.com

Internal Work Order	07-07017
Analysis Code	UUISO
Run Number	1

#	Date	Dept	User	Notes
1	07/06/07 09:14	PREP	JBARNARD	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN UNTIL NEAR DRY- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS
2	07/11/07 10:20	CHEM	TSMITH	Followed steps 12.2 to 12.2.7 in AP-005 rev. 9 . (Column separation for Uranium)
3	07/12/07 05:45	CHEM	TSMITH	Followed steps 12.2.7 to 12.5.5 in AP-005 rev. 9 . (Precipitated and filtered samples)

7-12-07

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
07-07017	
Analysis Code	Run
UUISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
005772P	Hydrofluoric Acid	Reagent Grade	JBARNARD	7/6/2007
005486P	Perchloric Acid	Reagent Grade	JBARNARD	7/6/2007
004527P	Sulfuric Acid	Reagent Grade	JBARNARD	7/6/2007
005886P	Nitric Acid	Reagent Grade	JBARNARD	7/6/2007
005839D03	Hydrochloric Acid	0.5N	TSMITH	7/11/2007
005592S	Hydrochloric Acid	6.5N	TSMITH	7/11/2007
005947S	Hydrochloric Acid	8N	TSMITH	7/11/2007
005955S	HCl - NH4I	8N - 0.1M	TSMITH	7/11/2007
005927S	HCl - HF	6.5N - 0.04N	TSMITH	7/11/2007
005554S	Neodymium Carrier	1 mg/ml	TSMITH	7/12/2007
005345P	Titanous Chloride	Reagent Grade	TSMITH	7/12/2007
005913P	Reagent Alcohol	Reagent Grade	TSMITH	7/12/2007
005878P	Hydrofluoric Acid	Reagent Grade	TSMITH	7/12/2007
005909S	Carbon substrate	Solution	TSMITH	7/12/2007

Alpha #3

DATE	Sample ID	Client ID	Load Time	Count Time	Analysis	Tech
7-3-07	0706152A (1-4)	Parsons	16:15	5hr 35m	Pu	
7-3-07	0706151A (1-4)	ALMAC	16:17	2Hr 50m	Po^{210}	
7-5-07	Daily pulser	LAB	0816	10m	MA	
7-5-07	0706147A (1-4)	BJC	17:15	2Hr 50m	Am	
7-5-07	0706148A (1-5)	BJC	17:20	2Hr 50m	Am	
7-6-07	Daily pulser	LAB	0620	10m	MA	
7-6-07	0706136A (1-3, 5)	BJC	0744	2HR 50m	Am	
7-6-07	0706132A (1-5)	S.T.	0744	2HR 50m	Pu	
7/6/07	Weekly Calibrations	LAB	12:30	2 1/2 HRS	α	AG
7/6/07	WEEKLY BKGD	LAB	15:27	16 HR 40m	α	AG
7-9-07	Daily pulser	LAB	0650	10m	MA	
7-9-07	0706125A (7)	Shiller/NAV	0757	5HR 35m	Pu	
7-9-07	0706152A (1-4)	Parsons	0757	5HR 35m	Am	
7-9-07	0706145A (1-8)	BJC	20:30	5hr 35m	UU	
7-10-07	Daily pulser	LAB	0541	10m	NA	
7-10-07	0706145A (1-8)	BJC	19:50	5hr 35m	Pu	
7-11-07	Daily pulser	LAB	074	10m	NA	
7-11-07	0706132A (1-6)	S.T.	0947	2HR 50m	Th	
7-11-07	0707025A (1-3)	PCC	0947	2HR 50m	Th	
7-11-07	0707028A (1-4)	N.D.	17:45	2Hr 50m	Ra	
7-12-07	Daily pulser	LAB	0553	10m	NA	
7-12-07	0707001A (4)	McGC	0928	2HR 50m	UU	
7-12-07	0707017A (1-4)	GCC	0928	2HR 50m	UU	
7-12-07	0707024A (1-3)	USG	0928	2HR 50m	UU	

ISO-TH NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	07-07017
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	07/06/07 09:13	PREP	JBARNARD	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN UNTIL NEAR DRY- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- PRECIPITATED WITH POTASSIUM SULFATE AND BA CARRIER- DECANTED SAMPLES AND CENTRIFUGED- ADDED .25M EDTA TO PRECIP, VORTEXED AND PUT SAMPLES IN A HOT WATER BATH- ADDED 10M KOH AND TICL3 AND PUT SAMPLES BACK IN THE HOT WATER BATH- VORTEXED AND CENTRIFUGED- ADDED 30MLS OF 8N HNO3 TO THE THORIUM PRECIP, VORTEXED AND SUBMITTED TO SEPARATIONS

7/6/07

EBERLINE SERVICES

Work Order Analysis Notes

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601 Scarboro Rd.
Oak Ridge, TN 37830
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Internal Work Order	07-07017
Analysis Code	ThISO
Run Number	1

#	Date	Dept	User	Notes
1	07/06/07 09:13	PREP	JBARNARD	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN UNTIL NEAR DRY- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- PRECIPITATED WITH POTASSIUM SULFATE AND BA CARRIER- DECANTED SAMPLES AND CENTRIFUGED- ADDED .25M EDTA TO PRECIP, VORTEXED AND PUT SAMPLES IN A HOT WATER BATH- ADDED 10M KOH AND TICL3 AND PUT SAMPLES BACK IN THE HOT WATER BATH- VORTEXED AND CENTRIFUGED- ADDED 30MLS OF 8N HNO3 TO THE THORIUM PRECIP, VORTEXED AND SUBMITTED TO SEPARATIONS
2	07/11/07 10:21	CHEM	TSMITH	Followed steps 12.3 to 12.3.4 in AP-005 rev. 9 . (Column separation for Thorium)
3	07/12/07 05:50	CHEM	TSMITH	Followed steps 12.3.4 to 12.5.5 in AP-005 rev. 9 . (Precipitated and filtered samples)

7-12-07

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
07-07017	
Analysis Code	Run
ThISO	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
003255D25	Barium Carrier	50 mg/ml	JBARNARD	7/6/2007
005827S	EDTA	0.25M	JBARNARD	7/6/2007
005772P	Hydrofluoric Acid	Reagent Grade	JBARNARD	7/6/2007
005886D01	Nitric Acid	8N	JBARNARD	7/6/2007
005886P	Nitric Acid	Reagent Grade	JBARNARD	7/6/2007
005486P	Perchloric Acid	Reagent Grade	JBARNARD	7/6/2007
001365D04	Potassium Hydroxide	10M	JBARNARD	7/6/2007
005804P	Potassium Sulfate	Reagent Grade	JBARNARD	7/6/2007
004527P	Sulfuric Acid	Reagent Grade	JBARNARD	7/6/2007
004692P	Titanous Chloride	Reagent Grade	JBARNARD	7/6/2007
005951S	Nitric Acid	8N	TSMITH	7/11/2007
005947S	Hydrochloric Acid	8N	TSMITH	7/11/2007
005909S	Carbon substrate	Solution	TSMITH	7/12/2007
000051D11	Cerium Carrier (Alpha iso)	Solution	TSMITH	7/12/2007
005913P	Reagent Alcohol	Reagent Grade	TSMITH	7/12/2007
005878P	Hydrofluoric Acid	Reagent Grade	TSMITH	7/12/2007

Alpha 1

Date	Sample #	Client	Load time	CT time	Analysis	Tech
7-10-07	Daily pulse	LMS	0541	10m	NA	
7-10-07	0706124A (1,2,4,5,7)	Stoller/NAV	0718	5HR 35 min	MM	
7-10-07	0706125A (1-6)	Stoller/NAV	0718	5HR 35m	MM	
7-10-07	0707017RA (1-4)	ECC	15:30	2HR 50m	RA	
7-10-07	0707010A (1-5)	BJC	20:30	2HR 50m	MM	
7-10-07	0706132A (1-5)	Solutient	20:35	2HR 50m	MM	
7-11-07	Daily pulse	LMS	0711	10m	NA	
7-11-07	0706120A (1-4)	M&EC	0921	2HR 50m	MM	
7-11-07	0706146A (1-7)	BJC	0921	2HR 50m	PM	
7-11-07	0707010A (1)	BJC	0921	2HR 50m	PM	
7-11-07	0707025A (4-7)	PCC	12:30	2HR 50m	TH	
7-12-07	Daily pulse	LMS	0553	10m	NA	
7-12-07	0707010A (1-5)	BJC	0928	2HR 50m	NP	
7-12-07	0707015A (1-4)	Parsons	0928	2HR 50m	ML	
7-12-07	0707001A (1-3)	M&EC	0928	2HR 50m	MM	
7-12-07	0707024A (4)	USG	12:43	2HR 50m	MM	
7-12-07	0707001A (1-4)	MEC	12:44	2HR 50m	TH	
7-12-07	0707017A (1-4)	ECC	12:45	2HR 50m	TH	
7-12-07	0707024A (1-3)	USG	12:46	2HR 50m	TH	

RA-226 NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	07-07017
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	07/06/07 09:12	PREP	JBARNARD	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN UNTIL NEAR DRY- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- PH'D SAMPLES TO 2.8-3.0- PRECIPITATED WITH POTASSIUM SULFATE AND BA AND PB CARRIERS- DECANTED SAMPLES AND CENTRIFUGED- ADDED .25M EDTA AND PHENOLPTHALEIN TO PRECIP, VORTEXED AND PUT SAMPLES IN A HOT WATER BATH- VORTEXED AND CHECKED PH- CENTRIFUGED AND TRANSFERRED SUPERNATE INTO CLEAN C-TUBES AND SUBMITTED TO SEPARATIONS

JBarnard
7/6/07

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	07-07017
Analysis Code	Ra226
Run Number	1

#	Date	Dept	User	Notes
1	07/06/07 09:12	PREP	JBARNARD	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN UNTIL NEAR DRY- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- PH'D SAMPLES TO 2.8-3.0- PRECIPITATED WITH POTASSIUM SULFATE AND BA AND PB CARRIERS- DECANTED SAMPLES AND CENTRIFUGED- ADDED .25M EDTA AND PHENOLPTHALEIN TO PRECIP, VORTEXED AND PUT SAMPLES IN A HOT WATER BATH- VORTEXED AND CHECKED PH- CENTRIFUGED AND TRANSFERRED SUPERNATE INTO CLEAN C-TUBES AND SUBMITTED TO SEPARATIONS
2	07/10/07 13:09	CHEM	DJOHNSON	Received samples in EDTA from prep lab. Re-precipitated samples with glacial acetic acid and ammonium sulfate. Recorded T0 time of 1230 hours. Filtered samples on tarred filters and then rinsed c-tubes and funnels with diH2O and filtered. Dried and reweighed samples. Submitted samples to the count room.

7/10/07

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
07-07017	
Analysis Code	Run
Ra226	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
005432P	Ammonium Hydroxide	Reagent Grade	JBARNARD	7/6/2007
003255D26	Barium Carrier	1 mg/ml	JBARNARD	7/6/2007
005827S	EDTA	0.25M	JBARNARD	7/6/2007
005772P	Hydrofluoric Acid	Reagent Grade	JBARNARD	7/6/2007
004484D03	Lead Carrier	40 mg/ml	JBARNARD	7/6/2007
005886P	Nitric Acid	Reagent Grade	JBARNARD	7/6/2007
005486P	Perchloric Acid	Reagent Grade	JBARNARD	7/6/2007
003643S	Phenolphthalein Indicator	0.1%	JBARNARD	7/6/2007
005804P	Potassium Sulfate	Reagent Grade	JBARNARD	7/6/2007
004527P	Sulfuric Acid	Reagent Grade	JBARNARD	7/6/2007
000868P	Acetic Acid	Reagent Grade	DJOHNSON	7/10/2007
005186D04	Ammonium Sulfate	200 mg/ml	DJOHNSON	7/10/2007
004769S	EDTA	0.25M	DJOHNSON	7/10/2007

Date	Sample #	Client	Load time	CT time	Analysis	Tech
7-10-07	Daily pulse	LHD	0541	10m	NR	[illegible]
7-10-07	0706124A (1,2,4,5,7)	Stoller/LHD	0718	5HR 35 min	LHD	[illegible]
7-10-07	0706125A (1-6)	Stoller/LHD	0718	5HR 35m	LHD	[illegible]
7-10-07	0707017RA (1-4)	ECC	15:30	2HR 50m	RC	[illegible]

RA-228 NOTES

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	07-07017
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	07/06/07 09:12	PREP	JBARNARD	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN UNTIL NEAR DRY- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- PH'D SAMPLES TO 2.8-3.0- PRECIPITATED WITH POTASSIUM SULFATE AND BA AND PB CARRIERS- DECANTED SAMPLES AND CENTRIFUGED- ADDED .25M EDTA AND PHENOLPTHALEIN TO PRECIP, VORTEXED AND PUT SAMPLES IN A HOT WATER BATH- VORTEXED AND CHECKED PH- CENTRIFUGED AND TRANSFERRED SUPERNATE INTO CLEAN C-TUBES AND SUBMITTED TO SEPARATIONS

JBarnard
7/6/07

EBERLINE SERVICES

Work Order Analysis Notes

Oak Ridge Laboratory
601 Scarboro Rd.
Oak Ridge, TN 37830
Voice: 865.481.0683
www.eberlineservices.com

Internal Work Order	07-07017
Analysis Code	Ra228
Run Number	1

#	Date	Dept	User	Notes
1	07/06/07 09:12	PREP	JBARNARD	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HF AND DRIED SAMPLES DOWN UNTIL NEAR DRY- ADDED MIXED ACIDS AND TOOK SAMPLES TO DRYNESS- PH'D SAMPLES TO 2.8-3.0- PRECIPITATED WITH POTASSIUM SULFATE AND BA AND PB CARRIERS- DECANTED SAMPLES AND CENTRIFUGED- ADDED .25M EDTA AND PHENOLPTHALEIN TO PRECIP, VORTEXED AND PUT SAMPLES IN A HOT WATER BATH- VORTEXED AND CHECKED PH- CENTRIFUGED AND TRANSFERRED SUPERNATE INTO CLEAN C-TUBES AND SUBMITTED TO SEPARATIONS
2	07/11/07 06:30	CHEM	DJOHNSON	Filters were returned from the count room and were placed into centrifuge tubes with EDTA.
3	07/12/07 13:22	CHEM	DJOHNSON	Removed filters from soaking and discarded them. Adjusted PH and added Yttrium carrier. Removed Lead interferences through two Lead Sulfide precipitations.
4	07/13/07 09:35	CHEM	DJOHNSON	Added 10mls of 18M NaOH to samples and recorded T1 time of 0650 hours for samples. Hot bathed and centrifuged samples. The supernates were discarded. Dissolved samples in 2mls of 6N HNO3. Then added 5mls of DiH2O and 3mls of 10M NaOH.
5	07/13/07 09:35	CHEM	DJOHNSON	Then vortexed, hot bathed and centrifuged samples. The supernates were discarded. Then added 2mls of 1N HNO3 and 2mls of 5% Ammonium Oxalate. Samples were vortexed, hot bathed and centrifuged. The supernates were then discarded. The precipitates were
6	07/13/07 09:35	CHEM	DJOHNSON	slurried with 5mls of DiH2O and vortexing. The samples were filtered on tarred filters. The c-tubes and funnels were rinsed with DiH2O and filtered. The filters were dried and reweighed. Sample#5 was low in recovery at ~59%. Mounted samples on planchets.
7	07/13/07 09:35	CHEM	DJOHNSON	Samples were covered in aluminum foil and submitted to the count room.

7/13/07

EBERLINE SERVICES

Reagents Used in an Analysis

Internal Work Order	
07-07017	
Analysis Code	Run
Ra228	1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
005432P	Ammonium Hydroxide	Reagent Grade	JBARNARD	7/6/2007
003255D26	Barium Carrier	1 mg/ml	JBARNARD	7/6/2007
005827S	EDTA	0.25M	JBARNARD	7/6/2007
005772P	Hydrofluoric Acid	Reagent Grade	JBARNARD	7/6/2007
004484D03	Lead Carrier	40 mg/ml	JBARNARD	7/6/2007
005886P	Nitric Acid	Reagent Grade	JBARNARD	7/6/2007
005486P	Perchloric Acid	Reagent Grade	JBARNARD	7/6/2007
003643S	Phenolphthalein Indicator	0.1%	JBARNARD	7/6/2007
005804P	Potassium Sulfate	Reagent Grade	JBARNARD	7/6/2007
004527P	Sulfuric Acid	Reagent Grade	JBARNARD	7/6/2007
005835S	EDTA	0.25M	DJOHNSON	7/12/2007
001848D14	Lead Carrier	1.5 mg/ml	DJOHNSON	7/12/2007
005765P	Nitric Acid	Reagent Grade	DJOHNSON	7/12/2007
005963D01	Ammonium Sulfide	2%	DJOHNSON	7/12/2007
000037D02	Ammonium Oxalate	5%	DJOHNSON	7/13/2007
005026D03	Nitric Acid	1N	DJOHNSON	7/13/2007
005700D01	Nitric Acid	6N	DJOHNSON	7/13/2007
005802D02	Sodium Hydroxide	10M	DJOHNSON	7/13/2007
000994S	Yttrium Carrier	9 mg/ml	DJOHNSON	7/13/2007
005802D03	Sodium Hydroxide	18M	DJOHNSON	7/13/2007

LB4110 Red

DATE	SAMPLE #	CLIENT	LOAD TIME	CT. TIME	ANALYSIS TECH
7-12-07	Daily Bkgd/Qc	LMB	0612 ~~0853~~	1HR/30m	Bkgd/Sr-90
7-12-07	0706145NPA(1-8)	BJC	0821	10m	Np
7-12-07	0707037AB(1-5)	M&EC	1014	30m	αβ
7-12-07	07070445A(1)	BJC	16:00	30m	Sr-890
7-12-07	07070445A(2-4)	BJC	16:10	3 HR	Sr-890
7-13-07	Daily Bkgd/Qc	LMB	0620 ~~0842~~	1HR/30m	Bkgd/Sr-90
7-13-07	0706120NPA(1-6)	M&EC	0843	10m	Np
7-13-07	0707001NPA(1-6)	M&EC	0844	10m	Np
7-13-07	0707037RA(1-4)	ECC	0945	3HR	Ra
7-13-07	0706128RA(1-4)	AAL	0945	3HR	Ra

SECTION VII

ANALYTICAL DATA (ISOTOPIC URANIUM)

07-07017
UUISO
Run 1

Work Order	07-07017
Analysis Code	UUISO
Run	1
Date Received	7/5/2007
Lab Deadline	7/26/2007
Client	Environmental Chemical Corporation
Project	Li Tungsten
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	EML U-02 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	U-232
Radiometric Sol#	U-10a
Tracer Act (dpm/g)	20.386
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/05/07 00:00	1.0000E+00
02	MBL	BLANK		07/05/07 00:00	1.0000E+00
03	DUP	5601-FSS-SU3-1014	49	05/25/07 09:45	1.2611E+00
04	DO	5601-FSS-SU3-1014	49	05/25/07 09:45	1.2002E+00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.6171	12.6										
02	MBL	0.6156	12.5										
03	DUP	0.6148	12.5										
04	DO	0.6123	12.5										

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

07-07017
UUISO
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/06/07 06:54	JBARNARD	07/12/07 05:57	TSMITH		
02	MBL			07/06/07 06:54	JBARNARD	07/12/07 05:57	TSMITH		
03	DUP			07/06/07 06:54	JBARNARD	07/12/07 05:57	TSMITH		
04	DO	07/06/07 08:29	JPACHELLA	07/06/07 06:54	JBARNARD	07/12/07 05:57	TSMITH		

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-234	LCS	LCS	pCi/g	7.63E+00	1.29E+00	6.30E-02	8.22E+00	92.73	OK		OK	
02	U-234	MBL	BLANK	pCi/g	1.04E-01	7.41E-02	6.54E-02					OK	INV
03	U-234	DUP	5601-FSS-SU3-1014	pCi/g	6.08E-01	1.82E-01	4.78E-02				OK	OK	
04	U-234	DO	5601-FSS-SU3-1014	pCi/g	5.82E-01	1.83E-01	7.80E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	UUISO	1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-234	LCS	07/05/07 00:00	1.00E+00	98.45				7/12/2007 5:57	
02	U-234	MBL	07/05/07 00:00	1.00E+00	110.19				7/12/2007 5:57	
03	U-234	DUP	05/25/07 09:45	1.26E+00	108.89				7/12/2007 5:57	
04	U-234	DO	05/25/07 09:45	1.20E+00	96.45				7/12/2007 5:57	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	UUISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	07/12/07 09:26		A_Spec	34	170	5.60 E+02	1.00 E-03	19.8
02	U-234	MBL	07/12/07 09:26		A_Spec	37	170	8.66 E+00	2.00 E-03	20
03	U-234	DUP	07/12/07 09:27		A_Spec	38	170	5.88 E+01	1.00 E-03	18.7
04	U-234	DO	07/12/07 09:27		A_Spec	42	170	5.22 E+01	5.00 E-03	20.6

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	UUISO	1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-235	LCS	LCS	pCi/g	3.36E-01	1.58E-01	4.55E-02	3.73E-01	90.00	OK		OK	
02	U-235	MBL	BLANK	pCi/g	2.98E-02	4.23E-02	4.03E-02					OK	INV
03	U-235	DUP	5601-FSS-SU3-1014	pCi/g	1.90E-02	3.69E-02	7.69E-02				INV	OK	
04	U-235	DO	5601-FSS-SU3-1014	pCi/g	1.10E-01	7.95E-02	3.73E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-235	LCS	07/05/07 00:00	1.00E+00	98.45				7/12/2007 5:57	
02	U-235	MBL	07/05/07 00:00	1.00E+00	110.19				7/12/2007 5:57	
03	U-235	DUP	05/25/07 09:45	1.26E+00	108.89				7/12/2007 5:57	
04	U-235	DO	05/25/07 09:45	1.20E+00	96.45				7/12/2007 5:57	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	UUISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	07/12/07 09:26		A_Spec	34	170	2.00 E+01	0.00 E+00	19.8
02	U-235	MBL	07/12/07 09:26		A_Spec	37	170	2.00 E+00	0.00 E+00	20
03	U-235	DUP	07/12/07 09:27		A_Spec	38	170	1.49 E+00	3.00 E-03	18.7
04	U-235	DO	07/12/07 09:27		A_Spec	42	170	8.00 E+00	0.00 E+00	20.6

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-238	LCS	LCS	pCi/g	7.78E+00	1.31E+00	6.28E-02	8.02E+00	97.09	OK		OK	
02	U-238	MBL	BLANK	pCi/g	9.40E-02	6.94E-02	5.56E-02					OK	INV
03	U-238	DUP	5601-FSS-SU3-1014	pCi/g	5.97E-01	1.79E-01	2.79E-02				INV	OK	
04	U-238	DO	5601-FSS-SU3-1014	pCi/g	7.70E-01	2.17E-01	7.27E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-238	LCS	07/05/07 00:00	1.00E+00	98.45				7/12/2007 5:57	
02	U-238	MBL	07/05/07 00:00	1.00E+00	110.19				7/12/2007 5:57	
03	U-238	DUP	05/25/07 09:45	1.26E+00	108.89				7/12/2007 5:57	
04	U-238	DO	05/25/07 09:45	1.20E+00	96.45				7/12/2007 5:57	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	UUISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	07/12/07 09:26		A_Spec	34	170	5.74 E+02	1.00 E-03	19.8
02	U-238	MBL	07/12/07 09:26		A_Spec	37	170	7.83 E+00	1.00 E-03	20
03	U-238	DUP	07/12/07 09:27		A_Spec	38	170	5.80 E+01	0.00 E+00	18.7
04	U-238	DO	07/12/07 09:27		A_Spec	42	170	6.93 E+01	4.00 E-03	20.6

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Client	Environmental Chemical Corporation
Eberline Services Work Order	07-07017
Analysis Code	UUISO
Run	1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
02	U-236	MBL	BLANK	pCi/g	-2.27E-03	4.55E-03	6.18E-02					OK	INV
03	U-236	DUP	5601-FSS-SU3-1014	pCi/g	2.29E-02	3.26E-02	3.10E-02				INV	OK	
04	U-236	DO	5601-FSS-SU3-1014	pCi/g	-2.10E-03	4.21E-03	5.72E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	UUISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
02	U-236	MBL	07/05/07 00:00	1.00E+00	110.19				7/12/2007 5:57	
03	U-236	DUP	05/25/07 09:45	1.26E+00	108.89				7/12/2007 5:57	
04	U-236	DO	05/25/07 09:45	1.20E+00	96.45				7/12/2007 5:57	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-UUISO-1

Run	1
Analysis Code	UUISO
Eberline Services Work Order	07-07017
Client	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
02	U-236	MBL	07/12/07 09:26		A_Spec	37	170	-1.70 E-01	1.00 E-03	20
03	U-236	DUP	07/12/07 09:27		A_Spec	38	170	2.00 E+00	0.00 E+00	18.7
04	U-236	DO	07/12/07 09:27		A_Spec	42	170	-1.70 E-01	1.00 E-03	20.6

Count Room Report
Client: Environmental Chemical Co

07-07017-UUISO-1 (pCi/g) in SO
Tracer ID: U-10a

34-42

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/05/07 00:00	1.0000	0.6171	12.5802				
02	MBL	BLANK	07/05/07 00:00	1.0000	0.6156	12.5496				
03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	1.2611	0.6148	12.5333				
04	DO	5601-FSS-SU3-1014	05/25/07 09:45	1.2002	0.6123	12.4823				

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
07-07017	1	UUISO	7/6/2007 6:51	JBARNARD		

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
U-234	U-8a	35.240	7/6/2007	0.500	0.5180				8.22	0.296	0.00	0.000	0.00	0.000	0.00	0.000
U-235	U-8a	1.600	7/6/2007	0.500	0.5180				0.37	0.013	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	7/6/2007	0.500	0.5180				8.02	0.289	0.00	0.000	0.00	0.000	0.00	0.000

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	U-232	U-10a	20.386	7/6/2007	0.6171	0.5900
02	U-232	U-10a	20.386	7/6/2007	0.6156	0.5900
03	U-232	U-10a	20.386	7/6/2007	0.6148	0.5900
04	U-232	U-10a	20.386	7/6/2007	0.6123	0.5900

Balance Printer Tapes

Tracer

0.6171 g
0.6156 g
0.6148 g
0.6123 g

LCS

0.5180 g

Matrix Spike

Eberline Services - Oak Ridge
Version 2.0 8/1999

Aliquot Worksheet

Printed: 7/6/2007 9:05 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
07-07017	1	UUISO	grams	7/26/2007	JBARNARD

Lab Fraction	Environmental Chemical Corporation Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	5601-FSS-SU3-1014	DUP					1.2611E+00	1.2611E+00				
04	5601-FSS-SU3-1014	DO					1.2002E+00	1.2002E+00				

1.2611 g
1.2002 g

Comments	

Technician: _____ Date: 7/6/07

Eberline Services - Oak Ridge
Prep Logbook
Version 2.0 8/1999

Rough Sample Preparation Log Book

Printed: 7/6/2007 8:29 AM

Work Order	Lab Deadline	Date Received in Prep	Date Sealed	Date Returned	Technician
07-07017	7/26/2007	7/5/2007	7/6/2007	7/7/2007	JPACHELLA

Eberline Fraction	Environmental Chemical Corporation Client ID	Tare (g) Pan Wt	Gross (g) Wet Wt.	Gross (g) Dry Wt.	Net (g) Wet Wt.	Net (g) Dry Wt.	Percent Liquid	Percent Solid	Gamma Dry Wt.	Gamma LEPS Wt.	Special Info
04	5601-FSS-SU3-1014	28.4000	1894.6500	1555.1600	1866.2500	1526.7600	18.19%	81.81%			

Comments	
Special Codes	H: Hot, O: Organic Hazard, P: PCB Hazard, R: Rush, T: Other (see comments)

Technician: JPachella Date: 7-6-07

020

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
12-JUL-2007 12:25:37

****

Spectral File: ND_AMS_ARCHIVE_C:C_0707017A-UU$01_UU.CNF

****

BATCH ID:	0707017A-UU	SAMPLE ID:	01
SAMPLE DATE:	12-JUL-2007 00:00	ALIQUOT:	1.000E+00 gram
SAMPLE TITLE:	SPIKE	DETECTOR NUMBER:	034
ACQ DATE:	12-JUL-2007 09:26	AVERAGE EFFICIENCY:	19.80%
ELAPSED LIVE TIME:	10200.	RECOVERY:	98.45%
TRACER ID:	UU-10A	TRACER FWHM (kev):	91.98
LAMBDA VALUE:	617.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	12.578	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 12:30	EFF CAL DATE:	6-JUL-2007 12:30
BKG FILENAME:	B_034_6JUL07	BKG ELAPSED TIME:	60000.

****

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
U232	5302.5	416.00	0.00	99.8	5.666E+00	7.296E-01	3.691E-02
U-234	4761.5	559.83	0.17	99.8	7.625E+00	1.289E+00	6.302E-02
U-235	4385.5	20.00	0.00	80.9	3.360E-01	1.581E-01	4.553E-02
U-236	4485.2	6.00	0.00	90.1	9.051E-02	7.508E-02	4.088E-02
U-238	4184.4	573.83	0.17	100.2	7.782E+00	1.311E+00	6.275E-02

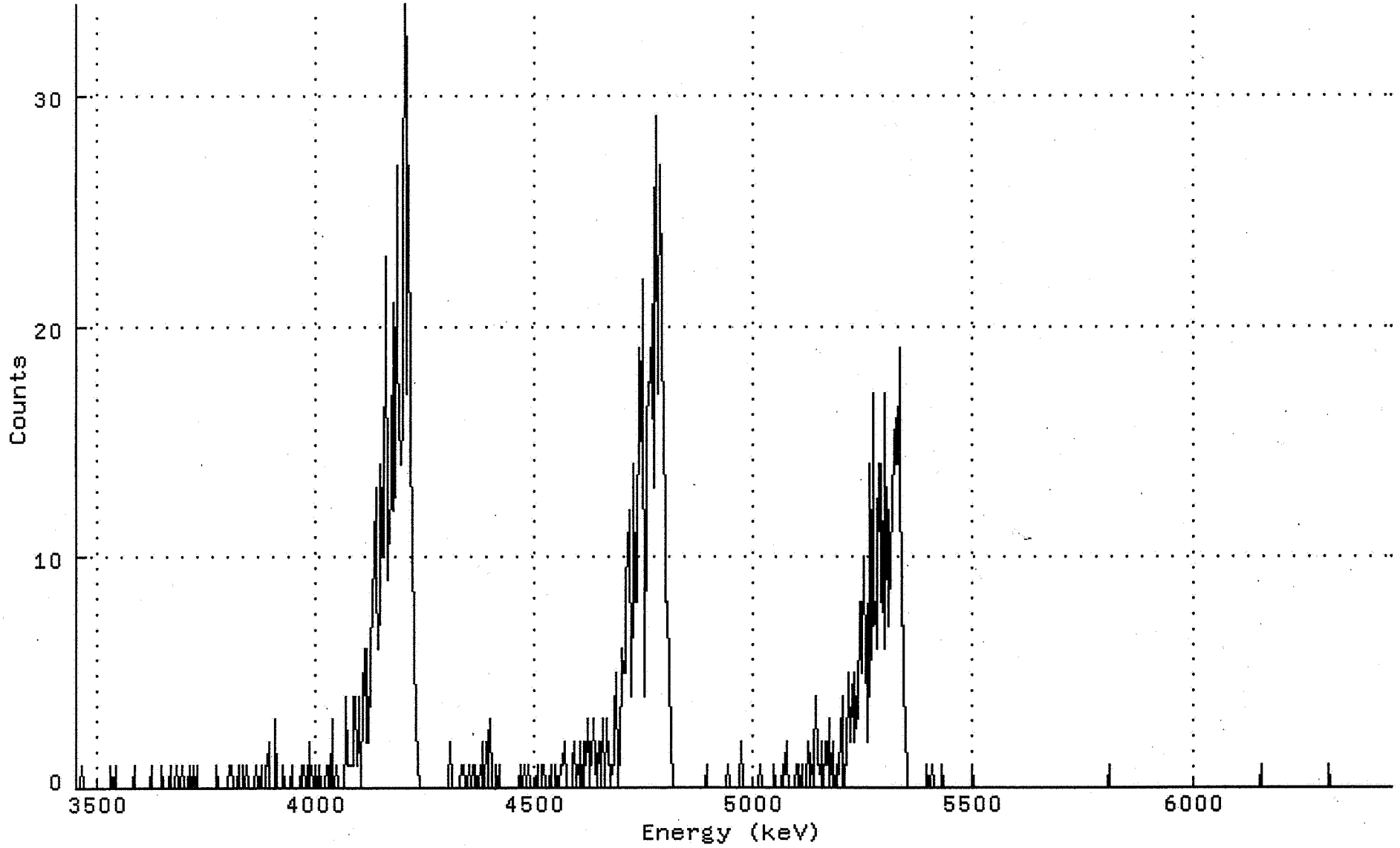
****

*** Tracer FWHM > 80.0 Kev ***

Analyst _____ Date 7.12.07

Reviewer _____ Date 7/12/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.C]C_0707017A-UU$01_UU.CNF;1
Title : 034
Sample Title: SPIKE
Start Time: 12-JUL-2007 09:26 Sample Time: 12-JUL-2007 00:00 Energy Offset: 3.44321E+03
Real Time : 0 02:50:00.10 Sample ID : 01 Energy Slope : 3.08545E+00
Live Time : 0 02:50:00.00 Sample Type: UU Energy Quad : -1.46266E-04



Channel Contents for ND_AMS_ARCHIVE_C:C_0707017A-UU$01_UU

Channel

1:	1	0	0	0	0	0	1	0	0	0	0	0	0	0
15:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29:	1	0	0	1	0	0	0	0	0	0	0	0	0	0
43:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
57:	0	0	1	0	0	0	0	0	0	0	1	0	0	0
71:	0	0	1	0	0	0	0	1	0	0	0	1	0	0
85:	0	0	1	0	0	1	0	0	1	0	0	0	0	0
99:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
113:	0	0	0	0	1	1	1	0	0	0	0	1	0	0
127:	0	1	0	1	1	0	0	0	0	0	1	1	0	0
141:	1	0	0	0	1	1	2	0	0	0	0	3	0	0
155:	0	0	0	1	0	0	0	0	0	1	0	0	0	0
169:	0	0	1	0	1	0	0	0	2	0	1	0	0	1
183:	0	0	1	0	0	0	0	1	0	1	0	3	0	0
197:	1	1	0	0	0	0	0	2	4	1	1	1	1	1
211:	4	4	1	4	3	0	4	4	6	2	6	2	5	9
225:	8	10	13	9	6	8	14	10	16	10	23	9	12	11
239:	13	21	12	13	27	19	16	14	16	24	34	31	17	27
253:	16	14	12	5	6	3	1	0	0	0	0	0	0	0
267:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
281:	0	0	0	2	0	0	0	0	0	0	0	1	1	1
295:	0	0	0	1	0	0	1	0	1	0	0	0	1	0
309:	2	0	2	0	2	3	0	0	0	0	1	0	1	0
323:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337:	1	0	0	1	0	0	1	0	0	0	0	0	0	1
351:	0	0	0	1	1	0	0	0	0	1	0	0	0	1
365:	0	0	0	1	1	1	2	0	0	0	0	0	1	2
379:	0	0	1	0	2	0	0	2	1	3	0	2	1	3
393:	3	1	0	1	2	0	1	3	0	0	3	1	2	0
407:	1	1	3	5	0	1	1	6	6	5	5	8	11	11
421:	12	4	9	14	8	9	8	19	15	22	20	4	13	16
435:	17	18	19	16	26	13	29	17	19	27	21	18	17	10
449:	8	8	5	2	2	0	0	0	0	0	0	0	0	0
463:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
477:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
491:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
505:	0	0	2	0	0	0	0	0	0	0	0	0	0	0
519:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
533:	1	0	0	0	0	0	1	0	1	2	1	0	0	0
547:	0	0	0	1	1	0	0	1	0	0	0	0	2	1
561:	0	1	0	1	4	1	1	1	0	2	0	2	1	1
575:	3	0	1	2	0	0	1	0	1	2	4	0	0	2
589:	1	5	2	2	4	5	2	3	5	3	8	5	6	10
603:	5	7	2	14	4	7	17	7	8	6	11	14	8	14
617:	9	6	17	9	12	7	10	12	12	15	16	14	14	19
631:	15	7	7	4	3	0	0	0	0	0	0	0	0	0
645:	0	0	0	0	0	0	0	1	0	0	0	1	0	0
659:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
687:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
701:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
757:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
771:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0	0	0	0	1	0	0
799:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
813:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
827:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
883:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
911:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
925:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
939:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
967:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
981:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 12-JUL-2007 12:25:33.20

Detector ID: 34 Acquisition Start: 12-JUL-2007 09:26:39.01
Live Time: 0 02:50:00.00 Real Time: 0 02:50:00.10
Batch Id: 0707017A-UU Sample Id: 01
Sample Type: UU

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4172.04	574	0	56.56	238.92	182	90	5.63E-02	4.2	
2	0	4371.26	20	0	94.72	305.20	281	43	1.96E-03	22.4	
3	0	4494.75	6	0	0.00	346.50	326	30	5.88E-04	40.8	
4	0	4749.44	560	0	60.96	432.21	382	82	5.49E-02	4.2	
5	0	5283.43	416	0	91.98	614.31	568	76	4.08E-02	4.9	

Background Counts Within Peak Regions Generated: 12-JUL-2007 12:25:35.31

Acquisition Start: 6-JUL-2007 15:30:35.01
Live Time: 0 16:40:00.00 Real Time: 0 16:40:00.10

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4133.63	1	0	3.11	226.50	182	90	1.67E-05	100.0	
2	0	4361.54	0	0	0.00	302.00	281	43	0.00E+00	0.0	
3	0	4476.98	0	0	0.00	340.50	326	30	0.00E+00	0.0	
4	0	4721.06	1	0	3.11	422.50	382	82	1.67E-05	100.0	
5	0	5257.08	0	0	0.00	605.50	568	76	0.00E+00	0.0	

Net Sample Counts Within Peak Regions Generated: 12-JUL-2007 12:25:35.60

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4172.04*	574	0	56.56	238.92	182	90	5.63E-02	4.2	
2	0	4371.26*	20	0	94.72	305.20	281	43	1.96E-03	22.4	
3	0	4494.75*	6	0	0.00	346.50	326	30	5.88E-04	40.8	
4	0	4749.44*	560	0	60.96	432.21	382	82	5.49E-02	4.2	
5	0	5283.43*	416	0	91.98	614.31	568	76	4.08E-02	4.9	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 12-JUL-2007 12:25:36

Configuration : MCA0:[AMSCOUNT]00021072$1
Analyses by : ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3
Sample title : SPIKE
Sample date : 12-JUL-2007 00:00:00 Acquisition date : 12-JUL-2007 09:26:39
Sample ID : 01 Sample quantity : 1.0000 gram
Sample type : UU Sample geometry :
Detector name : 034 Detector geometry:
Elapsed live time: 0 02:50:00.00 Elapsed real time: 0 02:50:00.10 0.0%
Energy tolerance : 100.00 keV Half life ratio : 8.00
Errors propagated: Yes Systematic Error : 3.00 %
Efficiency type : Average value Efficiencies at : Peak Energy
Abundance limit : 75.00

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	4172.04*	574	56.56	238.92	182	90	8.4		U-238	7.66
0	4371.26*	20	94.72	305.20	281	43	44.7		U-235	0.331
0	4494.75*	6	0.00	346.50	326	30	81.6		U-236	8.911E-02
0	4749.44*	560	60.96	432.21	382	82	8.5		U-234	7.51
0	5283.43*	416	91.98	614.31	568	76	9.8		U232	5.58

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
12-JUL-2007 12:25:49

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Spectral File: ND_AMS_ARCHIVE_R:R_0707017A-UU$02_UU.CNF

****

BATCH ID:	0707017A-UU	SAMPLE ID:	02
SAMPLE DATE:	12-JUL-2007 00:00	ALIQUOT:	1.000E+00 gram
SAMPLE TITLE:	BLANK	DETECTOR NUMBER:	037
ACQ DATE:	12-JUL-2007 09:26	AVERAGE EFFICIENCY:	19.98%
ELAPSED LIVE TIME:	10200.	RECOVERY:	110.19%
TRACER ID:	UU-10A	TRACER FWHM (kev):	60.74
LAMBDA VALUE:	616.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	12.548	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 12:30	EFF CAL DATE:	6-JUL-2007 12:30
BKG FILENAME:	B_037_6JUL07	BKG ELAPSED TIME:	60000.

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NUCLIDE ACTIVITY SUMMARY

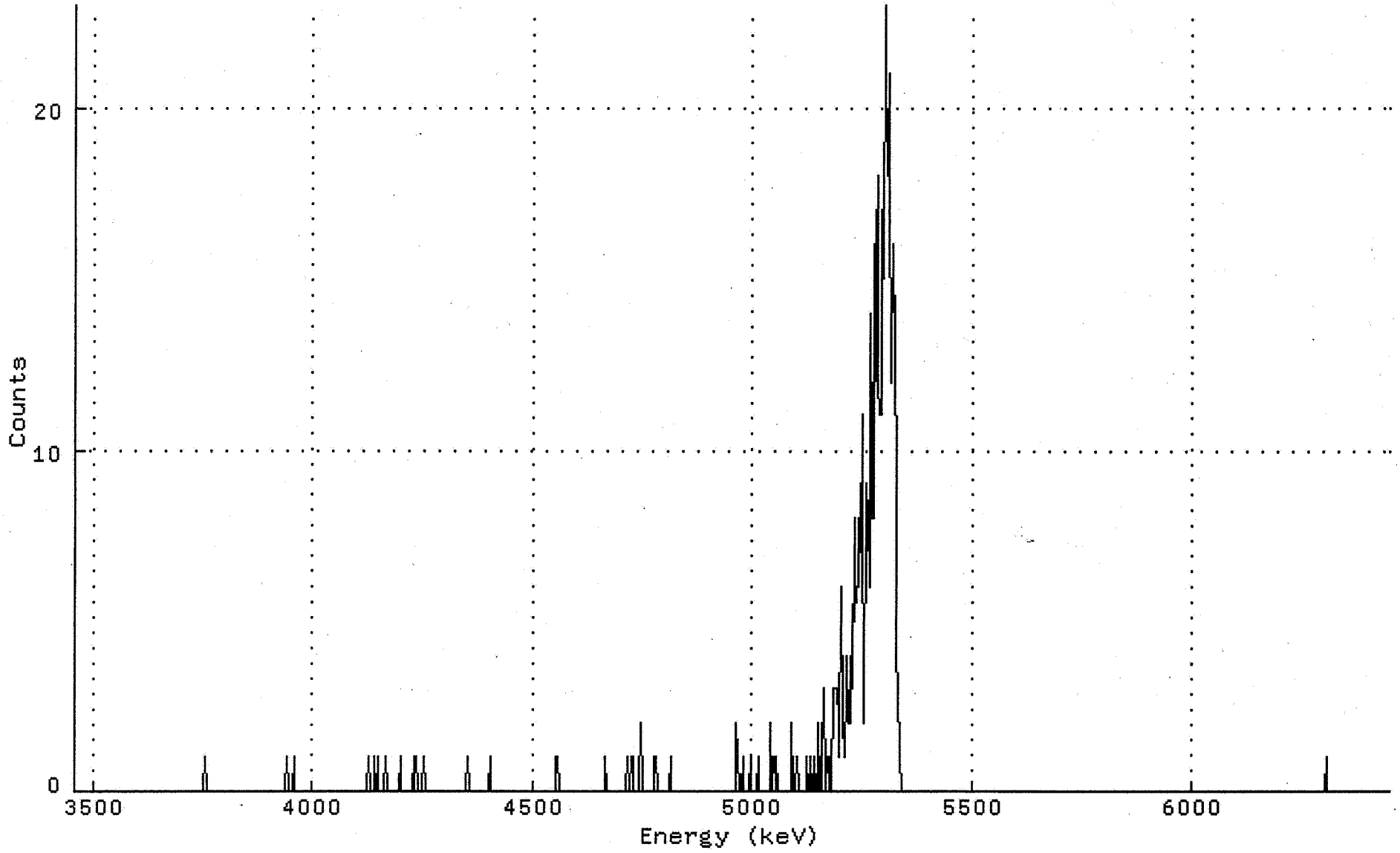
NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
U232	5302.5	468.66	0.34	99.8	5.652E+00	7.037E-01	6.538E-02
U-234	4761.5	8.66	0.34	99.8	1.044E-01	7.410E-02	6.538E-02
U-235	4385.5	2.00	0.00	80.9	2.975E-02	4.229E-02	4.032E-02
U-236	4485.2	-0.17	0.17	90.1	-2.271E-03	4.553E-03	6.181E-02
U-238	4184.4	7.83	0.17	100.2	9.402E-02	6.936E-02	5.556E-02

****

Analyst _____ Date 7-12-07

Reviewer _____ Date 7/12/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.R]R_0707017A-UU$02_UU.CNF;1
Title : 037
Sample Title: BLANK
Start Time: 12-JUL-2007 09:26 Sample Time: 12-JUL-2007 00:00 Energy Offset: 3.44860E+03
Real Time : 0 02:50:00.20 Sample ID : 02 Energy Slope : 3.09439E+00
Live Time : 0 02:50:00.00 Sample Type: UU Energy Quad : -1.63068E-04



077

Channel Contents for ND_AMS_ARCHIVE_R:R_0707017A-UU$02_UU

Channel

1:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155:	0	0	0	0	0	0	1	0	0	0	0	1	0	0
169:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
197:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
211:	0	0	0	0	0	0	0	0	0	0	0	1	0	0
225:	0	0	1	0	1	0	0	0	0	0	1	0	0	0
239:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
253:	0	0	0	1	0	1	0	0	0	0	0	1	0	0
267:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
295:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
309:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
323:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
351:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
365:	1	0	0	0	0	0	0	0	0	0	0	0	0	0
379:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
407:	0	0	0	0	0	0	0	0	0	0	0	0	1	0
421:	0	1	1	0	0	0	0	0	2	0	0	0	0	0
435:	0	0	0	0	0	1	1	0	0	0	0	0	0	0
449:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
463:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
477:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
491:	0	0	0	0	0	0	0	0	0	0	0	0	2	1
505:	0	0	0	1	0	0	0	0	0	1	0	0	0	0
519:	0	1	0	0	0	0	0	0	0	0	0	2	0	1
533:	0	1	0	0	0	0	0	0	0	0	0	0	0	2
547:	0	0	0	1	0	0	0	0	0	0	0	1	0	0
561:	1	0	0	1	0	0	2	0	0	1	3	0	1	1
575:	0	1	0	3	3	3	3	2	1	6	2	2	1	3
589:	4	2	2	4	3	8	5	6	6	8	7	11	9	2
603:	9	9	8	6	14	8	16	8	16	18	12	11	11	17
617:	15	23	22	18	21	18	12	16	15	14	8	4	3	1
631:	1	0	0	0	0	0	0	0	0	0	0	0	0	0
645:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
659:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
687:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
701:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
757:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
771:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
799:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
813:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
827:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
883:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
911:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
925:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
939:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
967:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
981:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 12-JUL-2007 12:25:44.18

Detector ID: 37 Acquisition Start: 12-JUL-2007 09:26:50.01
Live Time: 0 02:50:00.00 Real Time: 0 02:50:00.20
Batch Id: 0707017A-UU Sample Id: 02
Sample Type: UU

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4188.27	8	0	133.06	242.12	180	90	7.84E-04	35.4	
2	0	4378.71	2	0	55.70	305.50	279	43	1.96E-04	70.7	
3	0	4477.36	0	0	0.00	338.50	324	30	0.00E+00	0.0	
4	0	4744.77	9	0	3.09	428.56	380	82	8.82E-04	33.3	
5	0	5276.18	469	0	60.74	610.24	567	76	4.60E-02	4.6	

Background Counts Within Peak Regions Generated: 12-JUL-2007 12:25:47.15

Acquisition Start: 6-JUL-2007 15:30:44.01
Live Time: 0 16:40:00.00 Real Time: 0 16:40:00.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4136.75	1	0	3.07	224.50	180	90	1.67E-05	100.0	
2	0	4363.25	0	0	0.00	300.00	279	43	0.00E+00	0.0	
3	0	4478.13	1	0	3.07	338.50	324	30	1.67E-05	100.0	
4	0	4721.40	2	0	73.78	420.50	380	82	3.33E-05	70.7	
5	0	5260.34	2	0	36.89	604.50	567	76	3.33E-05	70.7	

Net Sample Counts Within Peak Regions Generated: 12-JUL-2007 12:25:47.44

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4188.27*	8	0	133.06	242.12	180	90	7.68E-04	36.2	
2	0	4378.71*	2	0	55.70	305.50	279	43	1.96E-04	70.7	
3	0	4477.36*	0	0	0.00	338.50	324	30	-1.67E-05	100.0	
4	0	4744.77*	9	0	3.09	428.56	380	82	8.49E-04	34.8	
5	0	5276.18*	469	0	60.74	610.24	567	76	4.59E-02	4.6	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 12-JUL-2007 12:25:48

Configuration	: MCA0:[AMSCOUNT]00021072$1		
Analyses by	: ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3		
Sample title	: BLANK		
Sample date	: 12-JUL-2007 00:00:00	Acquisition date	: 12-JUL-2007 09:26:50
Sample ID	: 02	Sample quantity	: 1.0000 gram
Sample type	: UU	Sample geometry	:
Detector name	: 037	Detector geometry	:
Elapsed live time	: 0 02:50:00.00	Elapsed real time	: 0 02:50:00.20 0.0%
Energy tolerance	: 100.00 keV	Half life ratio	: 8.00
Errors propagated	: Yes	Systematic Error	: 3.00 %
Efficiency type	: Average value	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	4188.27*	8133.06	242.12	180	90	72.4			U-238	0.104
0	4378.71*	2 55.70	305.50	279	43	141.4			U-235	3.279E-02
0	4477.36*	0 0.00	338.50	324	30	200.0			U-236	-2.502E-03
0	4744.77*	9 3.09	428.56	380	82	69.5			U-234	0.115
0	5276.18*	469 60.74	610.24	567	76	9.2			U232	6.23

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
12-JUL-2007 12:25:59

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Spectral File: ND_AMS_ARCHIVE_S:S_0707017A-UU$03_UU.CNF

****

BATCH ID:	0707017A-UU	SAMPLE ID:	03
SAMPLE DATE:	25-MAY-2007 00:00	ALIQUOT:	1.261E+00 gram
SAMPLE TITLE:	5601-FSS-SU3-1014	DETECTOR NUMBER:	038
ACQ DATE:	12-JUL-2007 09:27	AVERAGE EFFICIENCY:	18.70%
ELAPSED LIVE TIME:	10200.	RECOVERY:	108.89%
TRACER ID:	UU-10A	TRACER FWHM (kev):	92.35
LAMBDA VALUE:	615.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	12.547	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 12:30	EFF CAL DATE:	6-JUL-2007 12:30
BKG FILENAME:	B_038_6JUL07	BKG ELAPSED TIME:	60000.

****

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
U232	5302.5	433.00	0.00	99.8	4.482E+00	5.708E-01	2.801E-02
U-234	4761.5	58.83	0.17	99.8	6.081E-01	1.817E-01	4.783E-02
U-235	4385.5	1.49	0.51	80.9	1.900E-02	3.694E-02	7.690E-02
U-236	4485.2	2.00	0.00	90.1	2.290E-02	3.256E-02	3.103E-02
U-238	4184.4	58.00	0.00	100.2	5.970E-01	1.791E-01	2.789E-02

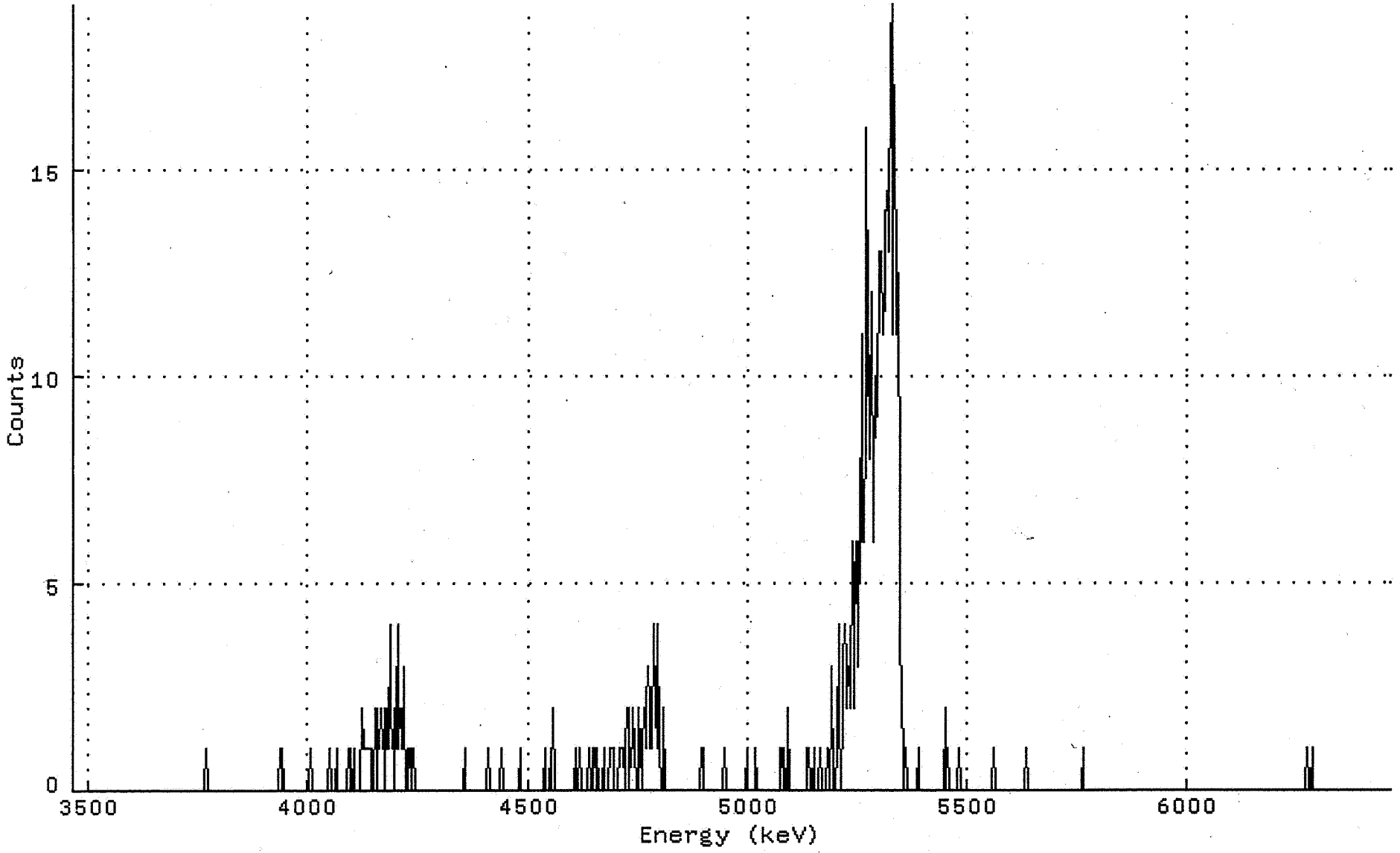
****

*** Tracer FWHM > 80.0 Kev ***

Analyst _____ Date 7-12-07

Reviewer _____ Date 7/12/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.S]S_0707017A-UU$03_UU.CNF;1
Title : 038
Sample Title: 5601-FSS-SU3-1014
Start Time: 12-JUL-2007 09:27 Sample Time: 25-MAY-2007 00:00 Energy Offset: 3.45399E+03
Real Time : 0 02:50:00.20 Sample ID : 03 Energy Slope : 3.11741E+00
Live Time : 0 02:50:00.00 Sample Type: UU Energy Quad : -1.75951E-04



Channel Contents for ND_AMS_ARCHIVE_S:S_0707017A-UU$03_UU

Channel

1:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155:	0	1	0	1	0	0	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
183:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
197:	0	1	0	0	0	0	0	0	0	0	1	1	0	0
211:	1	0	0	0	0	0	2	1	1	1	1	1	1	1
225:	0	0	2	0	2	1	2	2	1	2	0	2	1	4
239:	2	1	2	0	2	4	1	2	1	3	2	0	1	0
253:	1	0	1	1	0	0	0	0	0	0	0	0	0	0
267:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
295:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
309:	0	0	0	1	0	0	0	0	0	0	0	0	0	1
323:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
337:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
351:	0	0	0	0	1	0	0	0	1	0	2	0	0	0
365:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
379:	0	0	1	1	0	0	0	0	0	0	1	0	1	0
393:	1	0	1	0	0	0	0	1	0	0	0	0	1	1
407:	1	0	0	0	0	1	1	1	1	0	1	2	2	0
421:	1	1	2	1	0	0	2	1	0	1	2	1	2	3
435:	2	1	1	4	4	2	1	4	1	0	0	2	0	0
449:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
463:	0	0	0	0	0	0	0	0	0	0	0	0	1	1
477:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
491:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	1	0	0	0	0	0	0	1	0
519:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
533:	0	0	0	1	1	0	1	0	0	2	0	0	0	0
547:	0	0	0	0	0	0	0	0	0	0	1	1	0	0
561:	0	1	0	0	0	0	1	0	0	0	0	1	1	0
575:	2	3	0	0	0	1	4	2	0	2	3	4	3	2
589:	3	2	2	6	2	5	6	3	6	5	11	6	6	9
603:	16	11	8	9	12	6	7	10	9	9	13	13	13	11
617:	12	14	14	15	13	18	19	11	17	11	13	12	7	4
631:	2	1	0	1	0	0	0	0	0	0	0	0	0	1
645:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
659:	0	0	0	0	0	0	2	0	1	0	0	0	0	0
673:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
687:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
701:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
715:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
729:	1	0	0	0	0	0	0	0	0	0	0	0	0	0
743:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
757:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
771:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
799:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
813:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
827:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
883:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
911:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
925:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
939:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
953:	0	0	1	0	0	0	1	0	0	0	0	0	0	0
967:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
981:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 12-JUL-2007 12:25:54.85

Detector ID: 38 Acquisition Start: 12-JUL-2007 09:27:16.01
Live Time: 0 02:50:00.00 Real Time: 0 02:50:00.20
Batch Id: 0707017A-UU Sample Id: 03
Sample Type: UU

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4170.59	58	0	36.32	232.93	177	90	5.69E-03	13.1	
2	0	4382.42	2	0	59.23	303.00	276	42	1.96E-04	70.7	
3	0	4460.58	2	0	46.76	329.00	320	30	1.96E-04	70.7	
4	0	4745.05	59	0	29.36	424.31	376	81	5.78E-03	13.0	
5	0	5293.66	433	0	92.35	611.21	562	76	4.25E-02	4.8	

Background Counts Within Peak Regions Generated: 12-JUL-2007 12:25:57.10

Acquisition Start: 6-JUL-2007 15:30:54.01
Live Time: 0 16:40:00.00 Real Time: 0 16:40:00.10

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4134.85	0	0	0.00	221.50	177	90	0.00E+00	0.0	
2	0	4361.84	3	0	74.87	296.50	276	42	5.00E-05	57.7	
3	0	4476.08	0	0	0.00	334.50	320	30	0.00E+00	0.0	
4	0	4719.34	1	0	3.12	416.00	376	81	1.67E-05	100.0	
5	0	5258.31	0	0	0.00	599.50	562	76	0.00E+00	0.0	

Net Sample Counts Within Peak Regions Generated: 12-JUL-2007 12:25:57.67

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4170.59*	58	0	36.32	232.93	177	90	5.69E-03	13.1	
2	0	4382.42*	1	0	59.23	303.00	276	42	1.46E-04	96.9	
3	0	4460.58*	2	0	46.76	329.00	320	30	1.96E-04	70.7	
4	0	4745.05*	59	0	29.36	424.31	376	81	5.77E-03	13.1	
5	0	5293.66*	433	0	92.35	611.21	562	76	4.25E-02	4.8	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 12-JUL-2007 12:25:58

Configuration	: MCA0:[AMSCOUNT]00021072$1		
Analyses by	: ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3		
Sample title	: 5601-FSS-SU3-1014		
Sample date	: 25-MAY-2007 00:00:00	Acquisition date	: 12-JUL-2007 09:27:16
Sample ID	: 03	Sample quantity	: 1.2611 gram
Sample type	: UU	Sample geometry	:
Detector name	: 038	Detector geometry	:
Elapsed live time	: 0 02:50:00.00	Elapsed real time	: 0 02:50:00.20 0.0%
Energy tolerance	: 100.00 keV	Half life ratio	: 8.00
Errors propagated	: Yes	Systematic Error	: 3.00 %
Efficiency type	: Average value	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	4170.59*	58	36.32	232.93	177	90	26.3		U-238	0.650
0	4382.42*	1	59.23	303.00	276	42	193.9		U-235	2.069E-02
0	4460.58*	2	46.76	329.00	320	30	141.4		U-236	2.493E-02
0	4745.05*	59	29.36	424.31	376	81	26.1		U-234	0.662
0	5293.66*	433	92.35	611.21	562	76	9.6		U232	4.88

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
12-JUL-2007 12:26:08

****

Spectral File: ND_AMS_ARCHIVE_S:S_0707017A-UU$04_UU.CNF

****

BATCH ID:	0707017A-UU	SAMPLE ID:	04
SAMPLE DATE:	25-MAY-2007 00:00	ALIQUOT:	1.200E+00 gram
SAMPLE TITLE:	5601-FSS-SU3-1014	DETECTOR NUMBER:	042
ACQ DATE:	12-JUL-2007 09:27	AVERAGE EFFICIENCY:	20.56%
ELAPSED LIVE TIME:	10200.	RECOVERY:	96.45%
TRACER ID:	UU-10A	TRACER FWHM (kev):	75.62
LAMBDA VALUE:	615.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	12.547	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 12:30	EFF CAL DATE:	6-JUL-2007 12:30
BKG FILENAME:	B_042_6JUL07	BKG ELAPSED TIME:	60000.

****

NUCLIDE ACTIVITY SUMMARY

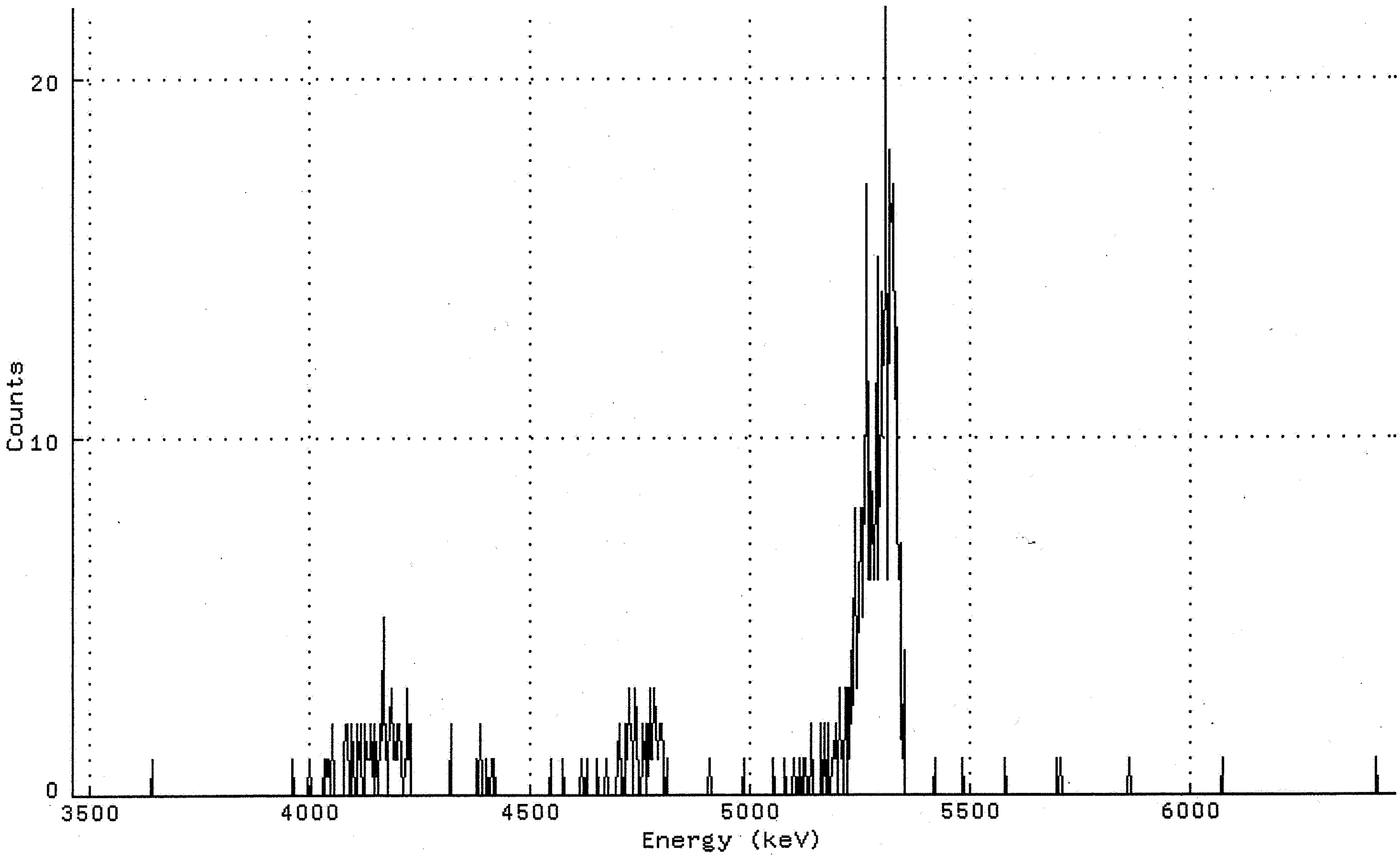
NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
U232	5302.5	421.66	0.34	99.8	4.709E+00	6.040E-01	6.047E-02
U-234	4761.5	52.15	0.85	99.8	5.817E-01	1.834E-01	7.804E-02
U-235	4385.5	8.00	0.00	80.9	1.101E-01	7.948E-02	3.729E-02
U-236	4485.2	-0.17	0.17	90.1	-2.100E-03	4.212E-03	5.717E-02
U-238	4184.4	69.32	0.68	100.2	7.699E-01	2.173E-01	7.268E-02

****

Analyst _____ Date 7-12-07

Reviewer _____ Date 7/13/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.S]S_0707017A-UU$04_UU.CNF;1
Title : 042
Sample Title: 5601-FSS-SU3-1014
Start Time: 12-JUL-2007 09:27 Sample Time: 25-MAY-2007 00:00 Energy Offset: 3.44949E+03
Real Time : 0 02:50:00.20 Sample ID : 04 Energy Slope : 3.12702E+00
Live Time : 0 02:50:00.00 Sample Type: UU Energy Quad : -1.82614E-04



Channel Contents for ND_AMS_ARCHIVE_S:S_0707017A-UU$04_UU

Channel

1:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57:	0	0	0	0	1	0	0	0	0	0	0	0	0	0
71:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
169:	0	0	0	0	0	0	0	0	1	0	0	0	0	0
183:	0	0	0	0	0	1	0	1	1	0	0	2	0	0
197:	0	0	0	0	0	0	1	2	1	2	0	0	2	1
211:	0	0	2	1	2	1	0	0	2	1	1	1	2	1
225:	0	2	1	0	2	1	2	5	2	2	0	1	2	3
239:	1	2	1	2	1	2	1	1	0	1	1	3	1	2
253:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
267:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
281:	0	2	0	0	0	0	0	0	0	0	0	0	0	0
295:	0	0	0	0	0	0	0	1	0	2	0	0	0	0
309:	1	0	0	0	1	0	1	0	0	0	0	0	0	0
323:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
351:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
365:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
379:	0	0	1	0	0	0	1	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	1	0	0	0	0	0	0
407:	0	1	1	2	0	1	0	0	2	1	3	2	2	1
421:	0	3	2	0	0	0	1	2	1	2	0	1	3	1
435:	1	3	3	2	1	1	2	2	1	0	0	1	0	0
449:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
463:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
477:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
491:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
505:	1	0	0	0	0	0	0	0	0	0	0	0	0	0
519:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
533:	0	0	0	0	1	0	0	0	0	0	0	1	0	0
547:	0	1	0	0	1	0	1	0	0	0	1	2	0	0
561:	0	0	0	0	2	0	2	1	0	2	0	0	1	1
575:	1	2	2	0	3	2	1	1	0	3	3	0	2	4
589:	2	3	8	7	3	6	5	8	8	5	10	10	17	6
603:	6	9	8	6	7	8	15	6	10	10	14	12	15	22
617:	6	18	17	16	17	17	11	13	8	6	7	2	1	4
631:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
659:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
673:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
687:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
701:	0	0	0	0	0	0	0	0	1	0	0	0	0	0
715:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743:	0	0	0	0	0	0	0	1	0	0	1	0	0	0
757:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
771:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
799:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
813:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
827:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
883:	1	0	0	0	0	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
911:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
925:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
939:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
967:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
981:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 12-JUL-2007 12:26:04.09

Detector ID: 42 Acquisition Start: 12-JUL-2007 09:27:33.01
Live Time: 0 02:50:00.00 Real Time: 0 02:50:00.20
Batch Id: 0707017A-UU Sample Id: 04
Sample Type: UU

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4149.69	70	0	59.67	226.93	178	90	6.86E-03	12.0	
2	0	4375.31	8	0	71.92	301.37	276	43	7.84E-04	35.4	
3	0	4476.54	0	0	0.00	335.00	321	29	0.00E+00	0.0	
4	0	4744.76	53	0	103.06	424.75	376	82	5.20E-03	13.7	
5	0	5285.40	422	0	75.62	608.75	562	76	4.14E-02	4.9	

Background Counts Within Peak Regions Generated: 12-JUL-2007 12:26:06.58

Acquisition Start: 6-JUL-2007 15:30:58.01
Live Time: 0 16:40:00.00 Real Time: 0 16:40:00.10

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4136.93	4	0	181.05	222.50	178	90	6.67E-05	50.0	
2	0	4362.48	0	0	0.00	297.00	276	43	0.00E+00	0.0	
3	0	4476.76	1	0	3.12	335.00	321	29	1.67E-05	100.0	
4	0	4720.09	5	0	234.12	416.50	376	82	8.33E-05	44.7	
5	0	5257.72	2	0	71.80	599.50	562	76	3.33E-05	70.7	

Net Sample Counts Within Peak Regions Generated: 12-JUL-2007 12:26:06.87

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4149.69*	69	0	59.67	226.93	178	90	6.80E-03	12.1	
2	0	4375.31*	8	0	71.92	301.37	276	43	7.84E-04	35.4	
3	0	4476.54*	0	0	0.00	335.00	321	29	-1.67E-05	100.0	
4	0	4744.76*	52	0	103.06	424.75	376	82	5.11E-03	14.0	
5	0	5285.40*	422	0	75.62	608.75	562	76	4.13E-02	4.9	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 12-JUL-2007 12:26:07

Configuration : MCA0:[AMSCOUNT]00021072$1
Analyses by : ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3
Sample title : 5601-FSS-SU3-1014
Sample date : 25-MAY-2007 00:00:00 Acquisition date : 12-JUL-2007 09:27:33
Sample ID : 04 Sample quantity : 1.2002 gram
Sample type : UU Sample geometry :
Detector name : 042 Detector geometry:
Elapsed live time: 0 02:50:00.00 Elapsed real time: 0 02:50:00.20 0.0%
Energy tolerance : 100.00 keV Half life ratio : 8.00
Errors propagated: Yes Systematic Error : 3.00 %
Efficiency type : Average value Efficiencies at : Peak Energy
Abundance limit : 75.00

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	4149.69*	69	59.67	226.93	178	90	24.2		U-238	0.743
0	4375.31*	8	71.92	301.37	276	43	70.7		U-235	0.106
0	4476.54*	0	0.00	335.00	321	29	200.0		U-236	-2.026E-03
0	4744.76*	52	103.06	424.75	376	82	28.0		U-234	0.561
0	5285.40*	422	75.62	608.75	562	76	9.7		U232	4.54

Review of QA results (Daily Pulser Check) 12-JUL-2007 06:05:48 Page 1

Detector	Parameter	Flag	Filename
1	ALL	Passed	D_001_NONE
2	ALL	Passed	D_002_NONE
3	ALL	Passed	D_003_NONE
4	OFFLINE		
5	OFFLINE		
6	ALL	Passed	D_006_NONE
7	OFFLINE		
8	ALL	Passed	D_008_NONE
9	ALL	Passed	D_009_NONE
10	ALL	Passed	D_010_NONE
11	ALL	Passed	D_011_NONE
12	ALL	Passed	D_012_NONE
13	ALL	Passed	D_013_NONE
14	ALL	Passed	D_014_NONE
15	OFFLINE		
16	ALL	Passed	D_016_NONE
17	OFFLINE		
18	ALL	Passed	D_018_NONE
19	ALL	Passed	D_019_NONE
20	OFFLINE		
21	OFFLINE		
22	OFFLINE		
23	ALL	Passed	D_023_NONE
24	OFFLINE		
25	ALL	Passed	D_025_NONE
26	OFFLINE		
27	OFFLINE		
28	ALL	Passed	D_028_NONE
29	ALL	Passed	D_029_NONE
30	ALL	Passed	D_030_NONE
31	ALL	Passed	D_031_NONE
32	OFFLINE		
33	ALL	Passed	D_033_NONE
34	ALL	Passed	D_034_NONE
35	OFFLINE		
36	OFFLINE		
37	ALL	Passed	D_037_NONE
38	ALL	Passed	D_038_NONE
39	OFFLINE		
40	OFFLINE		
41	OFFLINE		
42	ALL	Passed	D_042_NONE
43	OFFLINE		
44	OFFLINE		
45	ALL	Passed	D_045_NONE
46	ALL	Passed	D_046_NONE
47	ALL	Passed	D_047_NONE
48	ALL	Passed	D_048_NONE

APPROVAL DATE: 7.12.07 APPROVAL TIME: _____

APPROVED BY: _____ PROCEDURE # _____

SECTION VII

ANALYTICAL DATA (ISOTOPIC THORIUM)

07-07017
ThISO
Run 1

Work Order	07-07017
Analysis Code	ThISO
Run	1
Date Received	7/5/2007
Lab Deadline	7/26/2007
Client	Environmental Chemical Corporation
Project	Li Tungsten
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	EML Th-01 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Th-229
Radiometric Sol#	Th-18a
Tracer Act (dpm/g)	22.478
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/05/07 00:00	1.0000E+00
02	MBL	BLANK		07/05/07 00:00	1.0000E+00
03	DUP	5601-FSS-SU3-1014	49	05/25/07 09:45	1.0468E+00
04	DO	5601-FSS-SU3-1014	49	05/25/07 09:45	1.0333E+00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.2327	5.2										
02	MBL	0.2327	5.2										
03	DUP	0.2325	5.2										
04	DO	0.2317	5.2										

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/06/07 06:50	JBARNARD	07/12/07 05:58	TSMITH		
02	MBL			07/06/07 06:50	JBARNARD	07/12/07 05:58	TSMITH		
03	DUP			07/06/07 06:50	JBARNARD	07/12/07 05:58	TSMITH		
04	DO	07/06/07 08:29	JPACHELLA	07/06/07 06:50	JBARNARD	07/12/07 05:58	TSMITH		

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations
Work Order: 07-07017-ThISO-1

Client: Environmental Chemical Corporation
Eberline Services Work Order: 07-07017
Analysis Code: ThISO
Run: 1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-228	LCS	LCS	pCi/g	4.97E+00	1.14E+00	1.40E-01	4.76E+00	104.43	OK		OK	
02	TH-228	MBL	BLANK	pCi/g	1.23E-01	1.36E-01	2.16E-01					OK	INV
03	TH-228	DUP	5601-FSS-SU3-1014	pCi/g	7.57E-01	2.87E-01	1.67E-01				OK	OK	
04	TH-228	DO	5601-FSS-SU3-1014	pCi/g	8.69E-01	2.99E-01	1.16E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-228	LCS	07/05/07 00:00	1.00E+00	86.47				7/12/2007 5:58	
02	TH-228	MBL	07/05/07 00:00	1.00E+00	49.34				7/12/2007 5:58	
03	TH-228	DUP	05/25/07 09:45	1.05E+00	72.44				7/12/2007 5:58	
04	TH-228	DO	05/25/07 09:45	1.03E+00	77.10				7/12/2007 5:58	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	07/12/07 12:37		A_Spec	9	170.07	3.20 E+02	1.10 E-02	19.9
02	TH-228	MBL	07/12/07 12:37		A_Spec	10	170.02	4.64 E+00	8.00 E-03	20.3
03	TH-228	DUP	07/12/07 12:37		A_Spec	11	170.02	4.26 E+01	1.40 E-02	20.7
04	TH-228	DO	07/12/07 12:38		A_Spec	12	170.03	5.30 E+01	6.00 E-03	21.3

Preliminary Data Report & Analytical Calculations
Work Order: 07-07017-ThISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	ThISO	1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-230	LCS	LCS	pCi/g	5.41E+00	1.23E+00	1.01E-01	5.32E+00	101.73	OK		OK	
02	TH-230	MBL	BLANK	pCi/g	1.46E-01	1.36E-01	1.60E-01					OK	INV
03	TH-230	DUP	5601-FSS-SU3-1014	pCi/g	8.56E-01	3.01E-01	1.02E-01				OK	OK	
04	TH-230	DO	5601-FSS-SU3-1014	pCi/g	7.90E-01	2.75E-01	9.44E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-230	LCS	07/05/07 00:00	1.00E+00	86.47				7/12/2007 5:58	
02	TH-230	MBL	07/05/07 00:00	1.00E+00	49.34				7/12/2007 5:58	
03	TH-230	DUP	05/25/07 09:45	1.05E+00	72.44				7/12/2007 5:58	
04	TH-230	DO	05/25/07 09:45	1.03E+00	77.10				7/12/2007 5:58	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	ThISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-230	LCS	07/12/07 12:37		A_Spec	9	170.07	3.50 E+02	4.00 E-03	19.9
02	TH-230	MBL	07/12/07 12:37		A_Spec	10	170.02	5.49 E+00	3.00 E-03	20.3
03	TH-230	DUP	07/12/07 12:37		A_Spec	11	170.02	5.05 E+01	3.00 E-03	20.7
04	TH-230	DO	07/12/07 12:38		A_Spec	12	170.03	5.05 E+01	3.00 E-03	21.3

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Client	Environmental Chemical Corporation
Eberline Services Work Order	07-07017
Analysis Code	ThISO
Run	1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-232	LCS	LCS	pCi/g	5.34E+00	1.21E+00	1.01E-01	4.76E+00	112.06	OK		OK	
02	TH-232	MBL	BLANK	pCi/g	3.95E-02	7.72E-02	1.60E-01					OK	INV
03	TH-232	DUP	5601-FSS-SU3-1014	pCi/g	6.03E-01	2.39E-01	9.17E-02				INV	OK	
04	TH-232	DO	5601-FSS-SU3-1014	pCi/g	8.43E-01	2.86E-01	4.23E-02					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-232	LCS	07/05/07 00:00	1.00E+00	86.47				7/12/2007 5:58	
02	TH-232	MBL	07/05/07 00:00	1.00E+00	49.34				7/12/2007 5:58	
03	TH-232	DUP	05/25/07 09:45	1.05E+00	72.44				7/12/2007 5:58	
04	TH-232	DO	05/25/07 09:45	1.03E+00	77.10				7/12/2007 5:58	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Run	Analysis Code	Eberline Services Work Order	Client
1	ThISO	07-07017	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	07/12/07 12:37		A_Spec	9	170.07	3.46 E+02	4.00 E-03	19.9
02	TH-232	MBL	07/12/07 12:37		A_Spec	10	170.02	1.49 E+00	3.00 E-03	20.3
03	TH-232	DUP	07/12/07 12:37		A_Spec	11	170.02	3.57 E+01	2.00 E-03	20.7
04	TH-232	DO	07/12/07 12:38		A_Spec	12	170.03	5.40 E+01	0.00 E+00	21.3

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Client	Environmental Chemical Corporation
Eberline Services Work Order	07-07017
Analysis Code	ThISO
Run	1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
02	TH-227	MBL	BLANK	pCi/g	3.59E-02	7.95E-02	1.78E-01					OK	INV
03	TH-227	DUP	5601-FSS-SU3-1014	pCi/g	1.19E-01	1.03E-01	1.35E-01				OK	OK	
04	TH-227	DO	5601-FSS-SU3-1014	pCi/g	1.15E-01	9.48E-02	1.12E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	ThISO	1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
02	TH-227	MBL	07/05/07 00:00	1.00E+00	49.34				7/12/2007 5:58	
03	TH-227	DUP	05/25/07 09:45	1.05E+00	72.44				7/12/2007 5:58	
04	TH-227	DO	05/25/07 09:45	1.03E+00	77.10				7/12/2007 5:58	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-ThISO-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	ThISO	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
02	TH-227	MBL	07/12/07 12:37		A_Spec	10	170.02	1.32 E+00	4.00 E-03	20.3
03	TH-227	DUP	07/12/07 12:37		A_Spec	11	170.02	6.81 E+00	7.00 E-03	20.7
04	TH-227	DO	07/12/07 12:38		A_Spec	12	170.03	7.15 E+00	5.00 E-03	21.3

Count Room Report
Client: Environmental Chemical Co

07-07017-ThISO-1 (pCi/g) in SO
Tracer ID: Th-18a

9-12

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/05/07 00:00	1.0000	0.2327	5.2306				
02	MBL	BLANK	07/05/07 00:00	1.0000	0.2327	5.2306				
03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	1.0468	0.2325	5.2261				
04	DO	5601-FSS-SU3-1014	05/25/07 09:45	1.0333	0.2317	5.2082				

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
07-07017	1	ThISO	7/6/2007 6:47	JBARNARD	JB	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Th-228	Th-8b	103.560	7/6/2007	0.100	0.1021				4.76	0.171	0.00	0.000	0.00	0.000	0.00	0.000
Th-230	Th-1b	23.527	7/6/2007	0.500	0.5016				5.32	0.144	0.00	0.000	0.00	0.000	0.00	0.000
Th-232	Th-8b	103.560	7/6/2007	0.100	0.1021				4.76	0.171	0.00	0.000	0.00	0.000	0.00	0.000

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Th-229	Th-18a	22.478	7/6/2007	0.2327	0.4600
02	Th-229	Th-18a	22.478	7/6/2007	0.2327	0.4600
03	Th-229	Th-18a	22.478	7/6/2007	0.2325	0.4600
04	Th-229	Th-18a	22.478	7/6/2007	0.2317	0.4600

Balance Printer Tapes

Tracer

0.2327 g
0.2327 g
0.2325 g
0.2317 g

LCS

0.5016 g
0.1021 g

Matrix Spike

Eberline Services - Oak Ridge
Version 2.0 8/1999

Aliquot Worksheet

Printed: 7/6/2007 9:04 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
07-07017	1	ThISO	grams	7/26/2007	JBARNARD

Lab Fraction	Environmental Chemical Corporation Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	5601-FSS-SU3-1014	DUP					1.0468E+00	1.0468E+00				
04	5601-FSS-SU3-1014	DO					1.0333E+00	1.0333E+00				

Comments	

1.0468 g
1.0333 g

Technician: JBarnard Date: 7/6/07

Eberline Services - Oak Ridge
Prep Logbook
Version 2.0 8/1999

Rough Sample Preparation Log Book

Work Order	Lab Deadline	Date Received in Prep	Date Sealed	Date Returned	Technician
07-07017	7/26/2007	7/5/2007	7/6/2007	7/7/2007	JPACHELLA

Eberline	Environmental Chemical Corporation	Tare (g)	Gross (g)		Net (g)		Percent		Gamma		Special
Fraction	Client ID	Pan Wt	Wet Wt.	Dry Wt.	Wet Wt.	Dry Wt.	Liquid	Solid	Dry Wt.	LEPS Wt.	Info
04	5601-FSS-SU3-1014	28.4000	1894.6500	1555.1600	1866.2500	1526.7600	18.19%	81.81%			

Comments	
Special Codes	H: Hot, O: Organic Hazard, P: PCB Hazard, R: Rush, T: Other (see comments)

Technician: J Pachella

Date: 7-6-07

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
12-JUL-2007 15:46:23

****
Spectral File: ND_AMS_ARCHIVE_C:C_0707017A-TH$01_TH.CNF
****

BATCH ID:	0707017A-TH	SAMPLE ID:	01
SAMPLE DATE:	5-JUL-2007 00:00	ALIQUOT: 1.000E+00	gram
SAMPLE TITLE:	SPIKE	DETECTOR NUMBER:	009
ACQ DATE:	12-JUL-2007 12:37	AVERAGE EFFICIENCY:	19.88%
ELAPSED LIVE TIME:	10204.	RECOVERY:	86.47%
TRACER ID:	TH-18A	TRACER FWHM (kev):	263.43
LAMBDA VALUE:	233.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	5.230	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 07:08	EFF CAL DATE:	6-JUL-2007 07:08
BKG FILENAME:	B_009_6JUL07	BKG ELAPSED TIME:	60001.

****

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
TH-227	5850.0	-0.36	1.36	97.5	-5.702E-03	3.512E-02	1.286E-01
TH-228	5400.0	320.13	1.87	99.9	4.974E+00	1.140E+00	1.399E-01
TH229	4872.0	152.15	0.85	99.5	2.356E+00	4.417E-01	1.084E-01
TH-230	4672.0	350.32	0.68	99.8	5.408E+00	1.227E+00	1.010E-01
TH-232	3997.0	346.32	0.68	100.0	5.337E+00	1.212E+00	1.009E-01

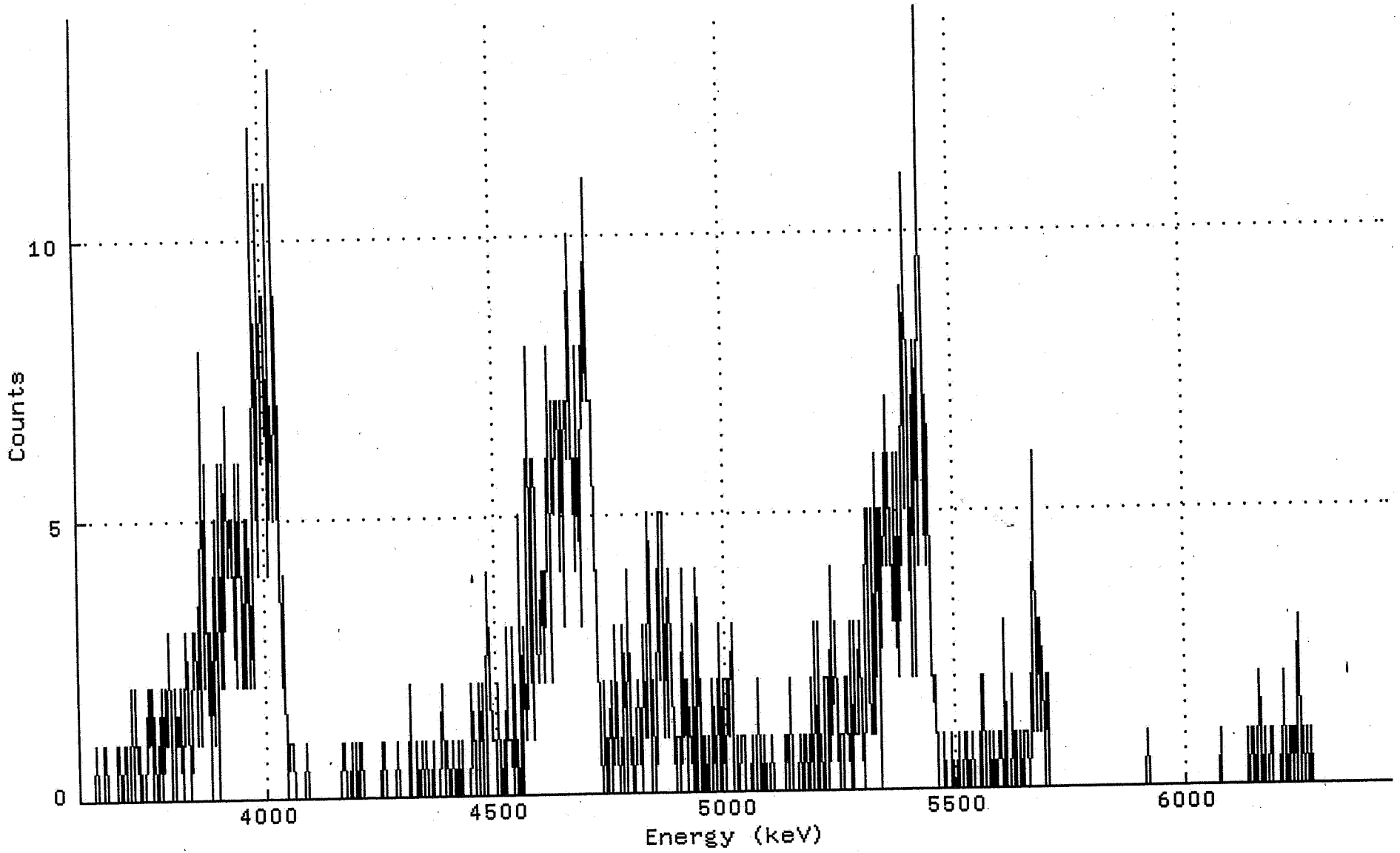
****

*** Tracer FWHM > 80.0 Kev ***

Analyst _____ Date 7/12/07

Reviewer _____ Date 7/13/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.C]C_0707017A-TH$01_TH.CNF;1
Title : 009
Sample Title: SPIKE
Start Time: 12-JUL-2007 12:37
Real Time : 0 02:50:04.00
Live Time : 0 02:50:04.00
Sample Time: 5-JUL-2007 00:00:
Sample ID : 01
Sample Type: TH
Energy Offset: 3.58029E+03
Energy Slope : 2.91654E+00
Energy Quad : -1.18963E-04



Channel Contents for ND_AMS_ARCHIVE_C:C_0707017A-TH$01_TH

Channel															
1:	10204	10204	0	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0
29:	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0
43:	2	0	2	1	1	0	1	0	0	0	0	1	2	1	0
57:	2	0	2	1	0	1	0	1	2	0	1	2	1	1	0
71:	3	1	0	0	0	2	1	1	2	1	0	2	1	3	0
85:	2	2	0	1	3	3	3	2	1	3	4	1	8	2	0
99:	6	3	3	0	3	2	1	3	5	0	6	4	2	6	0
113:	2	4	7	6	4	5	4	5	3	2	6	4	4	6	0
127:	2	2	5	2	5	4	2	3	4	2	12	5	6	4	0
141:	11	6	8	9	8	9	4	11	5	7	5	8	13	5	0
155:	7	5	2	4	3	0	1	1	1	1	0	0	0	0	0
169:	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
183:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
197:	0	0	0	0	1	1	1	0	0	0	0	1	0	0	0
211:	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
239:	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
253:	2	0	0	0	0	1	0	0	0	1	0	0	1	0	0
267:	0	0	0	1	0	0	0	0	0	1	1	2	0	0	0
281:	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0
295:	0	0	0	0	1	2	1	1	0	0	0	2	1	2	0
309:	0	0	0	1	4	2	1	1	1	1	0	2	0	1	0
323:	0	1	0	0	3	1	1	1	0	3	1	0	1	0	0
337:	0	5	0	3	3	1	2	4	8	3	1	6	6	5	0
351:	3	2	3	3	4	2	4	3	5	4	8	2	3	7	0
365:	5	7	6	7	6	4	7	3	6	7	7	6	8	10	0
379:	6	6	4	8	5	6	3	6	7	9	7	8	11	7	0
393:	7	7	7	4	4	3	1	0	1	2	0	0	1	1	0
407:	2	0	1	1	3	1	0	0	1	0	3	2	1	0	0
421:	4	1	0	1	0	1	1	2	1	1	0	3	3	1	0
435:	1	1	5	4	0	2	0	0	1	4	2	5	5	5	0
449:	1	3	1	3	4	2	2	1	0	1	1	1	0	1	0
463:	4	1	2	0	2	1	1	0	3	0	0	4	3	0	0
477:	2	0	1	0	0	1	0	0	0	2	1	0	0	2	0
491:	0	3	0	2	1	0	2	1	2	2	3	0	0	0	0
505:	1	0	1	1	1	1	0	0	0	0	0	1	0	0	0
519:	0	0	2	0	1	0	0	1	0	0	0	0	1	0	0
533:	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0
547:	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0
561:	0	2	1	0	2	3	0	3	0	1	0	1	0	2	0
575:	2	0	1	4	1	2	2	3	1	0	1	1	1	0	0
589:	2	2	1	1	0	3	0	3	1	1	1	2	3	1	0
603:	1	0	2	3	5	5	2	1	1	5	1	6	2	5	0
617:	5	0	5	4	4	5	7	4	6	4	5	3	3	6	0
631:	3	2	6	3	5	4	9	5	6	11	5	2	3	7	0
645:	2	8	7	4	8	8	11	14	5	4	7	6	3	2	0
659:	2	1	2	0	0	0	0	0	1	0	0	0	0	0	0
673:	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0
687:	0	0	1	0	0	0	0	0	0	2	0	2	0	0	0
701:	0	0	1	0	0	1	0	0	0	1	1	1	0	0	0
715:	3	0	0	0	0	1	2	0	1	0	0	0	1	0	0
729:	0	1	1	1	1	0	1	2	1	2	6	1	1	3	0
743:	1	3	2	1	0	2	2	0	0	0	0	0	0	0	0
757:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
771:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
799:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
813:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
827:	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
883:	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
911:	0	1	0	1	0	1	0	2	1	0	0	1	0	0	0
925:	0	0	1	1	0	0	0	0	0	0	0	1	0	2	0
939:	0	1	0	1	0	1	1	0	1	0	2	3	0	1	0
953:	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0
967:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
981:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1023:	0	0													

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 12-JUL-2007 15:46:20.26

Detector ID: 9 Acquisition Start: 12-JUL-2007 12:37:10.01
Live Time: 0 02:50:04.00 Real Time: 0 02:50:04.00
Batch Id: 0707017A-TH Sample Id: 01
Sample Type: TH

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3951.03	347	0170.43	127.78		76	105	3.40E-02	5.4	
2	0	4633.53	351	0149.09	366.61		293	107	3.44E-02	5.3	
3	0	4882.55	153	0263.43	454.95		399	135	1.50E-02	8.1	
4	0	5356.83	322	0 47.01	625.07		551	109	3.16E-02	5.6	
5	0	5913.62	1	0 2.92	828.00		750	129	9.80E-05	100.0	

Background Counts Within Peak Regions Generated: 12-JUL-2007 15:46:22.19

Acquisition Start: 6-JUL-2007 15:28:24.01
Live Time: 0 16:40:01.00 Real Time: 0 16:40:01.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3952.67	4	0200.74	128.00		76	105	6.67E-05	50.0	
2	0	4575.27	4	0256.02	346.00		293	107	6.67E-05	50.0	
3	0	4913.43	5	0215.29	466.00		399	135	8.33E-05	44.7	
4	0	5301.07	11	0305.48	605.00		551	109	1.83E-04	30.2	
5	0	5875.76	8	0142.56	814.00		750	129	1.33E-04	35.4	

Net Sample Counts Within Peak Regions Generated: 12-JUL-2007 15:46:22.44

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3951.03*	346	0170.43	127.78		76	1Q5	3.39E-02	5.4	
2	0	4633.53*	350	0149.09	366.61		293	107	3.43E-02	5.3	
3	0	4882.55*	152	0263.43	454.95		399	135	1.49E-02	8.1	
4	0	5356.83*	320	0 47.01	625.07		551	109	3.14E-02	5.6	
5	0	5913.62*	0	0 2.92	828.00		750	129	-3.53E-05	307.8	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 12-JUL-2007 15:46:23

Configuration : MCA0:[AMSCOUNT]00021072$1
Analyses by : ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3
Sample title : SPIKE
Sample date : 5-JUL-2007 00:00:00
Sample ID : 01
Sample type : TH
Detector name : 009
Elapsed live time: 0 02:50:04.00
Energy tolerance : 100.00 keV
Errors propagated: Yes
Efficiency type : Average value
Abundance limit : 75.00

Acquisition date : 12-JUL-2007 12:37:10
Sample quantity : 1.0000 gram
Sample geometry :
Detector geometry:
Elapsed real time: 0 02:50:04.00 0.0%
Half life ratio : 8.00
Systematic Error : 3.00 %
Efficiencies at : Peak Energy

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	3951.03*	346170.43	127.78		76	105	10.8		TH-232	4.61
0	4633.53*	350149.09	366.61		293	107	10.7		TH-230	4.68
0	4882.55*	152263.43	454.95		399	135	16.3		TH229	2.04
0	5356.83*	320 47.01	625.07		551	109	11.2		TH-228	4.30
0	5913.62*	0 2.92	828.00		750	129	615.6		TH-227	-4.930E-03

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
12-JUL-2007 15:46:35

Spectral File: ND_AMS_ARCHIVE_R:R_0707017A-TH$02_TH.CNF

BATCH ID:	0707017A-TH	SAMPLE ID:	02
SAMPLE DATE:	12-JUL-2007 00:00	ALIQUOT:	1.000E+00 gram
SAMPLE TITLE:	BLANK	DETECTOR NUMBER:	010
ACQ DATE:	12-JUL-2007 12:37	AVERAGE EFFICIENCY:	20.27%
ELAPSED LIVE TIME:	10201.	RECOVERY:	49.34%
TRACER ID:	TH-18A	TRACER FWHM (kev):	86.40
LAMBDA VALUE:	233.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	5.230	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 07:08	EFF CAL DATE:	6-JUL-2007 07:08
BKG FILENAME:	B_010_6JUL07	BKG ELAPSED TIME:	60005.

NUCLIDE ACTIVITY SUMMARY

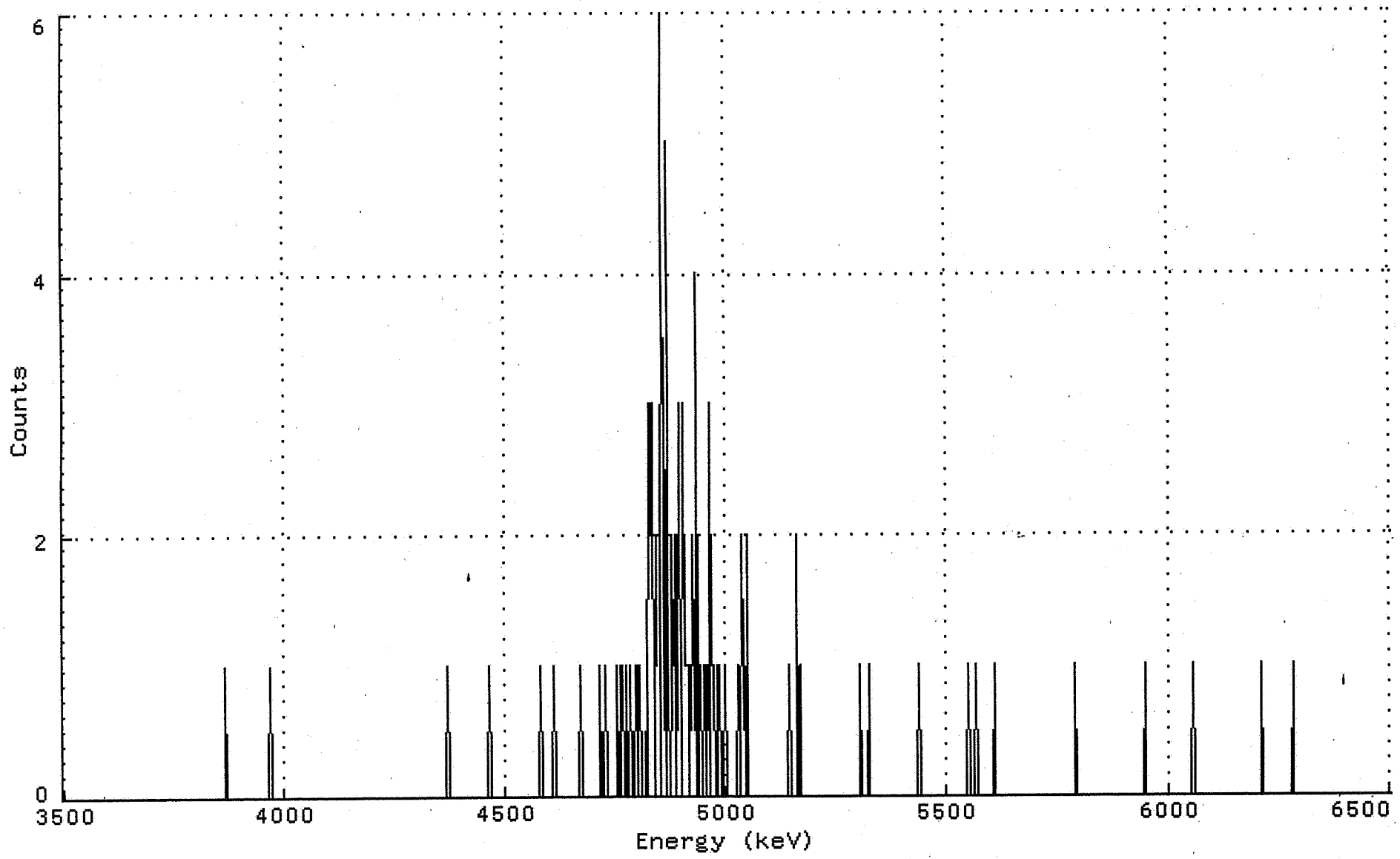
NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
TH-227	5850.0	1.32	0.68	97.5	3.588E-02	7.954E-02	1.779E-01
TH-228	5400.0	4.64	1.36	99.9	1.231E-01	1.358E-01	2.156E-01
TH229	4872.0	88.49	0.51	99.5	2.356E+00	5.485E-01	1.606E-01
TH-230	4672.0	5.49	0.51	99.8	1.457E-01	1.357E-01	1.601E-01
TH-232	3997.0	1.49	0.51	100.0	3.948E-02	7.715E-02	1.598E-01

*** Tracer FWHM > 80.0 Kev ***

Analyst [signature] Date 7/12/07

Reviewer [signature] Date 7/13/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.R]R_0707017A-TH$02_TH.CNF;1
Title : 010
Sample Title: BLANK
Start Time: 12-JUL-2007 12:37 Sample Time: 12-JUL-2007 00:00 Energy Offset: 3.48628E+03
Real Time : 0 02:50:01.00 Sample ID : 02 Energy Slope : 3.11364E+00
Live Time : 0 02:50:01.00 Sample Type: TH Energy Quad : -1.65457E-04



Channel Contents for ND_AMS_ARCHIVE_R:R_0707017A-TH$02_TH

Channel

1:	10201	10201	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
127:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
197:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
211:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
239:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
253:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
267:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
295:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
309:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
323:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
351:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
365:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
379:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
393:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
407:	1	0	0	0	0	0	0	0	0	1	0	0	1	1
421:	0	0	1	0	1	1	0	0	0	1	1	0	1	0
435:	0	0	0	1	0	3	3	2	3	0	0	2	2	2
449:	0	6	1	1	0	5	1	0	1	2	1	2	0	1
463:	3	0	0	3	1	1	1	1	0	1	1	2	1	0
477:	4	0	1	0	0	1	1	0	1	0	3	1	1	1
491:	0	1	0	1	0	0	0	1	0	0	0	0	1	0
505:	0	0	0	1	1	0	2	1	1	0	2	0	0	0
519:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
533:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547:	0	1	0	0	0	0	0	2	0	1	0	0	0	0
561:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
575:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
589:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
603:	1	0	0	0	0	0	1	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
645:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
659:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
687:	1	0	0	0	0	1	1	0	0	0	0	0	0	0
701:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
715:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
757:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
771:	1	0	0	0	0	0	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
799:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
813:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
827:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855:	0	0	0	0	0	0	0	0	0	1	1	0	0	0
869:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
883:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
911:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
925:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
939:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
967:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
981:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 12-JUL-2007 15:46:31.77

Detector ID: 10 Acquisition Start: 12-JUL-2007 12:37:22.01
Live Time: 0 02:50:01.00 Real Time: 0 02:50:01.00
Batch Id: 0707017A-TH Sample Id: 02
Sample Type: TH

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3917.41	2	0105.86	139.50	101	99	1.96E-04	70.7	
2	0	4627.14	6	0 0.00	373.83	306	102	5.88E-04	40.8	
3	0	4889.53	89	0 86.40	462.02	407	127	8.72E-03	10.6	
4	0	5257.95	6	0 3.11	587.33	550	104	5.88E-04	40.8	
5	0	5867.02	2	0174.36	798.50	740	124	1.96E-04	70.7	

Background Counts Within Peak Regions Generated: 12-JUL-2007 15:46:33.89

Acquisition Start: 6-JUL-2007 15:28:27.01
Live Time: 0 16:40:05.00 Real Time: 0 16:40:05.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3949.70	3	0 18.22	150.00	101	99	5.00E-05	57.7	
2	0	4574.71	3	0260.56	356.50	306	102	5.00E-05	57.7	
3	0	4912.84	3	0269.86	470.00	407	127	5.00E-05	57.7	
4	0	5299.82	8	0189.22	601.50	550	104	1.33E-04	35.4	
5	0	5878.52	4	0254.35	801.50	740	124	6.67E-05	50.0	

Net Sample Counts Within Peak Regions Generated: 12-JUL-2007 15:46:34.19

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3917.41*	1	0105.86	139.50	101	99	1.46E-04	96.9	
2	0	4627.14*	5	0 0.00	373.83	306	102	5.38E-04	44.9	
3	0	4889.53*	88	0 86.40	462.02	407	127	8.67E-03	10.7	
4	0	5257.95*	5	0 3.11	587.33	550	104	4.55E-04	53.8	
5	0	5867.02*	1	0174.36	798.50	740	124	1.29E-04	110.2	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 12-JUL-2007 15:46:35

Configuration	: MCA0:[AMSCOUNT]00021072$1		
Analyses by	: ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3		
Sample title	: BLANK		
Sample date	: 12-JUL-2007 00:00:00	Acquisition date	: 12-JUL-2007 12:37:22
Sample ID	: 02	Sample quantity	: 1.0000 gram
Sample type	: TH	Sample geometry	:
Detector name	: 010	Detector geometry	:
Elapsed live time	: 0 02:50:01.00	Elapsed real time	: 0 02:50:01.00 0.0%
Energy tolerance	: 100.00 keV	Half life ratio	: 8.00
Errors propagated	: Yes	Systematic Error	: 3.00 %
Efficiency type	: Average value	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	3917.41*	1105.86	139.50	101	99193.9				TH-232	1.948E-02
0	4627.14*	5 0.00	373.83	306	102	89.9			TH-230	7.190E-02
0	4889.53*	88 86.40	462.02	407	127	21.3			TH229	1.16
0	5257.95*	5 3.11	587.33	550	104107.6				TH-228	6.073E-02
0	5867.02*	1174.36	798.50	740	124220.4				TH-227	1.770E-02

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ALPHA SPECTROMETRY REPORT
12-JUL-2007 15:46:46

****

Spectral File: ND_AMS_ARCHIVE_S:S_0707017A-TH$03_TH.CNF

****

BATCH ID:	0707017A-TH	SAMPLE ID:	03
SAMPLE DATE:	25-MAY-2007 00:00	ALIQUOT: 1.047E+00	gram
SAMPLE TITLE:	5601-FSS-SU3-1014	DETECTOR NUMBER:	011
ACQ DATE:	12-JUL-2007 12:37	AVERAGE EFFICIENCY:	20.66%
ELAPSED LIVE TIME:	10201.	RECOVERY:	72.44%
TRACER ID:	TH-18A	TRACER FWHM (kev):	151.47
LAMBDA VALUE:	232.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	5.226	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 07:08	EFF CAL DATE: 6-JUL-2007	07:08
BKG FILENAME:	B_011_6JUL07	BKG ELAPSED TIME:	60002.

****

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
TH-227	5850.0	6.81	1.19	97.5	1.186E-01	1.028E-01	1.350E-01
TH-228	5400.0	42.62	2.38	99.9	7.569E-01	2.871E-01	1.673E-01
TH229	4872.0	132.32	0.68	99.5	2.249E+00	4.446E-01	1.112E-01
TH-230	4672.0	50.49	0.51	99.8	8.555E-01	3.014E-01	1.022E-01
TH-232	3997.0	35.66	0.34	100.0	6.031E-01	2.393E-01	9.170E-02

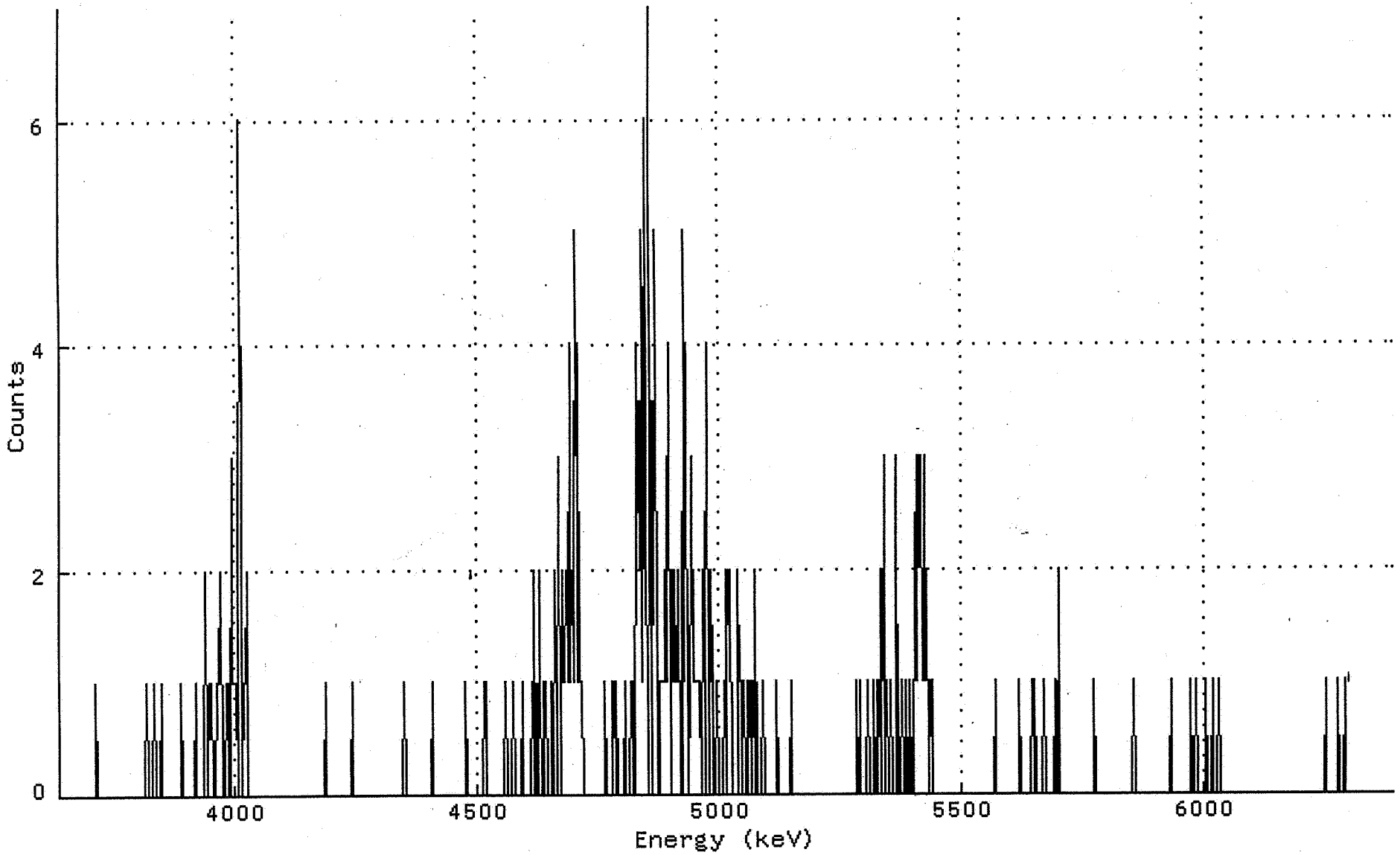
****

*** Tracer FWHM > 80.0 Kev ***

Analyst _____ Date 7/12/07

Reviewer _____ Date 7/13/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.S]S_0707017A-TH$03_TH.CNF;1
Title : 011
Sample Title: 5601-FSS-SU3-1014
Start Time: 12-JUL-2007 12:37 Sample Time: 25-MAY-2007 00:00 Energy Offset: 3.62838E+03
Real Time : 0 02:50:01.00 Sample ID : 03 Energy Slope : 2.82792E+00
Live Time : 0 02:50:01.00 Sample Type: TH Energy Quad : -1.30093E-04



Channel Contents for ND_AMS_ARCHIVE_S:S_0707017A-TH$03_TH

Channel														
1:	10201	10201	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
43:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
71:	0	0	1	0	0	0	0	1	0	0	0	0	0	0
85:	0	0	0	0	0	0	0	0	1	0	0	0	0	0
99:	0	0	0	0	1	0	0	0	0	0	0	0	2	0
113:	1	1	1	0	0	0	1	1	1	2	0	0	0	1
127:	1	0	0	3	1	1	1	0	1	6	2	0	1	1
141:	2	0	0	0	0	0	0	0	0	0	0	0	0	0
155:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
197:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
211:	0	0	0	0	0	0	0	0	1	0	0	0	0	0
225:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
239:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
253:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
267:	0	0	0	0	0	0	0	0	0	0	0	0	1	0
281:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
295:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
309:	0	0	0	0	0	0	0	0	0	1	1	0	0	0
323:	0	0	0	0	0	0	0	0	0	0	0	1	0	0
337:	0	0	1	1	0	0	0	0	0	1	0	0	0	0
351:	0	0	0	1	0	2	0	0	2	1	0	0	1	1
365:	0	0	0	0	1	0	2	0	0	3	0	0	2	1
379:	1	2	1	4	1	2	1	2	5	1	4	1	1	1
393:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
407:	0	0	1	0	0	0	0	0	1	1	0	1	0	0
421:	0	0	0	1	0	0	0	0	1	0	1	0	3	4
435:	3	2	5	1	3	6	3	0	3	7	0	3	2	5
449:	0	0	1	1	1	1	1	3	1	4	0	0	2	1
463:	2	1	2	0	1	0	5	1	4	0	0	1	2	3
477:	1	1	1	1	1	0	0	2	0	1	4	0	0	2
491:	1	0	0	1	1	0	0	0	0	1	0	2	2	1
505:	2	0	0	0	0	0	2	1	1	0	1	0	1	0
519:	1	0	1	1	0	2	0	0	0	0	1	1	0	0
533:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
547:	0	0	0	0	1	0	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
575:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
589:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
603:	0	1	0	0	0	0	0	1	0	0	0	0	1	0
617:	0	1	1	0	2	1	3	0	1	0	0	1	0	0
631:	0	0	3	0	0	0	1	0	0	1	0	0	1	0
645:	1	0	2	3	1	3	3	3	1	1	3	1	1	0
659:	1	1	0	0	0	0	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
687:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
701:	0	0	0	0	0	0	0	0	1	0	0	0	0	0
715:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
729:	0	0	0	0	0	0	0	0	0	1	0	1	0	0
743:	0	0	0	1	1	0	0	0	0	0	0	0	1	0
757:	0	2	0	0	0	0	0	0	0	0	0	0	0	0
771:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
785:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
799:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
813:	0	0	0	0	1	0	0	0	0	0	0	0	0	0
827:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
855:	0	0	0	0	0	0	0	0	1	0	0	0	1	0
869:	0	0	0	0	0	0	1	0	0	0	0	1	0	0
883:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
911:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
925:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
939:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
967:	0	0	0	1	0	0	0	0	0	0	0	0	0	1
981:	0	0	0	0	1	0	0	0	0	0	0	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 12-JUL-2007 15:46:41.23

Detector ID: 11 Acquisition Start: 12-JUL-2007 12:37:41.01
Live Time: 0 02:50:01.00 Real Time: 0 02:50:01.00
Batch Id: 0707017A-TH Sample Id: 03
Sample Type: TH

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3972.62	36	0	3.81	122.42	61	108	3.53E-03	16.7	
2	0	4660.87	51	0	44.29	371.45	285	111	5.00E-03	14.0	
3	0	4911.04	133	0	151.47	463.45	395	139	1.30E-02	8.7	
4	0	5383.07	45	0	98.94	639.29	552	113	4.41E-03	14.9	
5	0	5944.64	8	0	282.79	852.50	759	135	7.84E-04	35.4	

Background Counts Within Peak Regions Generated: 12-JUL-2007 15:46:44.28

Acquisition Start: 6-JUL-2007 15:28:30.01
Live Time: 0 16:40:02.00 Real Time: 0 16:40:02.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3950.81	2	0	124.56	114.50	61	108	3.33E-05	70.7	
2	0	4576.07	3	0	141.55	340.00	285	111	5.00E-05	57.7	
3	0	4914.34	4	0	115.72	464.00	395	139	6.67E-05	50.0	
4	0	5302.23	14	0	2.83	608.00	552	113	2.33E-04	26.7	
5	0	5879.35	7	0	4.16	826.00	759	135	1.17E-04	37.8	

Net Sample Counts Within Peak Regions Generated: 12-JUL-2007 15:46:44.55

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3972.62*	36	0	3.81	122.42	61	108	3.50E-03	16.8	
2	0	4660.87*	50	0	44.29	371.45	285	111	4.95E-03	14.2	
3	0	4911.04*	132	0	151.47	463.45	395	139	1.30E-02	8.7	
4	0	5383.07*	43	0	98.94	639.29	552	113	4.18E-03	15.8	
5	0	5944.64*	7	0	282.79	852.50	759	135	6.68E-04	42.1	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 12-JUL-2007 15:46:45

Configuration	: MCA0:[AMSCOUNT]00021072$1		
Analyses by	: ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3		
Sample title	: 5601-FSS-SU3-1014		
Sample date	: 25-MAY-2007 00:00:00	Acquisition date	: 12-JUL-2007 12:37:41
Sample ID	: 03	Sample quantity	: 1.0468 gram
Sample type	: TH	Sample geometry	:
Detector name	: 011	Detector geometry	:
Elapsed live time	: 0 02:50:01.00	Elapsed real time	: 0 02:50:01.00 0.0%
Energy tolerance	: 100.00 keV	Half life ratio	: 8.00
Errors propagated	: Yes	Systematic Error	: 3.00 %
Efficiency type	: Average value	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	3972.62*	36	3.81	122.42	61	108	33.7		TH-232	0.437
0	4660.87*	50	44.29	371.45	285	111	28.3		TH-230	0.620
0	4911.04*	132	151.47	463.45	395	139	17.4		TH229	1.63
0	5383.07*	43	98.94	639.29	552	113	31.6		TH-228	0.548
0	5944.64*	72	82.79	852.50	759	135	84.1		TH-227	8.593E-02

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
12-JUL-2007 15:46:55

Spectral File: ND_AMS_ARCHIVE_S:S_0707017A-TH$04_TH.CNF

BATCH ID:	0707017A-TH	SAMPLE ID:	04
SAMPLE DATE:	25-MAY-2007 00:00	ALIQUOT:	1.033E+00 gram
SAMPLE TITLE:	5601-FSS-SU3-1014	DETECTOR NUMBER:	012
ACQ DATE:	12-JUL-2007 12:38	AVERAGE EFFICIENCY:	21.29%
ELAPSED LIVE TIME:	10202.	RECOVERY:	77.10%
TRACER ID:	TH-18A	TRACER FWHM (kev):	14.38
LAMBDA VALUE:	232.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	5.208	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 07:09	EFF CAL DATE:	6-JUL-2007 07:09
BKG FILENAME:	B_012_6JUL07	BKG ELAPSED TIME:	60007.

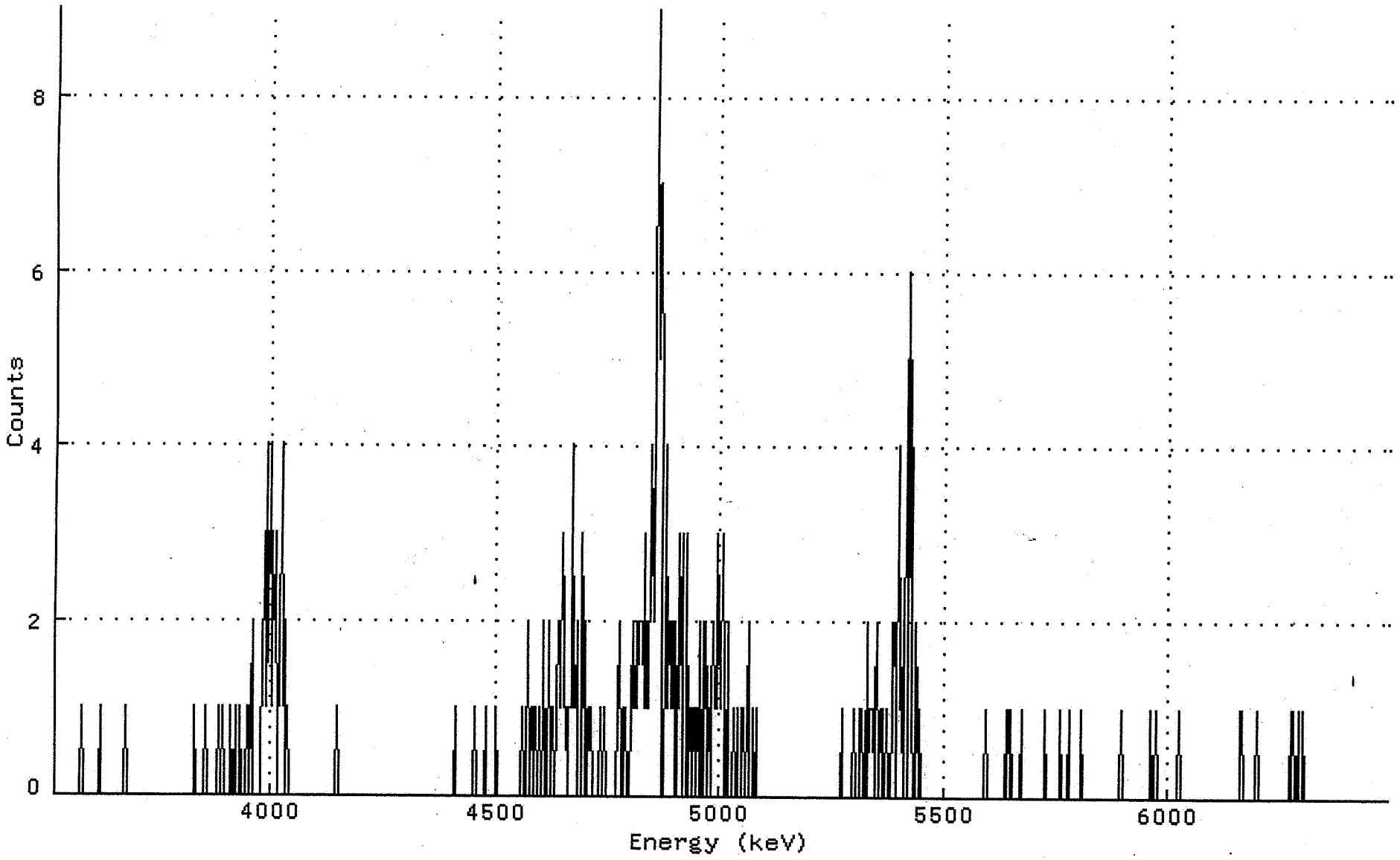
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
TH-227	5850.0	7.15	0.85	97.5	1.150E-01	9.475E-02	1.121E-01
TH-228	5400.0	52.98	1.02	99.9	8.689E-01	2.990E-01	1.158E-01
TH229	4872.0	144.66	0.34	99.5	2.270E+00	4.332E-01	8.509E-02
TH-230	4672.0	50.49	0.51	99.8	7.900E-01	2.753E-01	9.437E-02
TH-232	3997.0	54.00	0.00	100.0	8.434E-01	2.864E-01	4.233E-02

Analyst _____ Date 7/12/07

Reviewer _____ Date 7/13/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.S]S_0707017A-TH$04_TH.CNF;1
Title : 012
Sample Title: 5601-FSS-SU3-1014
Start Time: 12-JUL-2007 12:38 Sample Time: 25-MAY-2007 00:00 Energy Offset: 3.50779E+03
Real Time : 0 02:50:02.00 Sample ID : 04 Energy Slope : 3.03980E+00
Live Time : 0 02:50:02.00 Sample Type: TH Energy Quad : -1.24999E-04



Channel Contents for ND_AMS_ARCHIVE_S:S_0707017A-TH$04_TH

Channel

1:	10202	10202	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	0	0	0	0	0	0	1	1	0	0	0	0	0
29:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
43:	0	0	0	0	0	0	0	0	0	0	0	0	1	0
57:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
113:	0	1	0	0	0	0	0	0	0	0	0	1	0	0
127:	1	0	0	0	0	0	1	0	0	1	0	0	0	1
141:	0	0	0	0	1	1	0	1	2	0	0	0	0	0
155:	0	2	2	2	4	1	2	4	1	3	2	3	3	0
169:	2	3	4	1	2	0	1	0	0	0	0	0	0	0
183:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
197:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
211:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
239:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
253:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
267:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
295:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
309:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
323:	1	0	0	0	0	0	0	0	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
351:	1	0	1	0	2	0	0	1	1	0	1	0	0	1
365:	0	1	2	0	0	0	2	0	1	1	0	0	1	2
379:	1	1	3	2	1	1	0	1	1	1	4	1	1	2
393:	0	0	0	3	2	0	2	0	1	1	1	0	0	0
407:	0	0	0	1	0	0	1	0	0	0	0	0	0	0
421:	0	0	1	2	2	0	0	1	1	0	0	0	1	2
435:	1	1	2	1	2	2	2	2	1	3	1	1	3	4
449:	3	2	4	9	5	5	7	4	0	0	2	4	1	2
463:	2	1	2	0	2	0	3	1	2	3	0	0	0	3
477:	0	1	0	1	1	0	1	1	0	2	0	2	0	2
491:	1	0	1	0	1	2	1	1	3	2	1	1	3	1
505:	0	0	2	0	0	0	0	1	0	1	0	0	0	1
519:	1	0	0	1	2	0	0	0	1	0	1	0	0	0
533:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
575:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
589:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
603:	0	1	0	0	0	0	1	1	0	0	0	2	0	1
617:	1	1	1	0	1	2	0	0	1	0	1	0	1	0
631:	0	0	1	2	2	1	0	4	1	2	1	0	1	4
645:	6	0	5	3	1	0	0	2	1	0	1	0	0	0
659:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
687:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
701:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
715:	0	0	0	0	0	0	0	1	0	1	0	1	0	0
729:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
743:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
757:	0	0	0	0	0	0	0	0	1	0	0	0	0	0
771:	1	0	0	0	0	0	0	0	0	0	1	0	0	0
785:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
799:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
813:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
827:	0	0	0	0	0	0	0	0	1	0	0	0	1	0
841:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
869:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
883:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0	1	1	0	0	0
911:	0	0	0	0	0	0	0	0	1	0	0	0	0	0
925:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
939:	0	0	0	0	0	0	0	1	0	1	0	0	0	1
953:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
967:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
981:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 12-JUL-2007 15:46:50.70

Detector ID: 12 Acquisition Start: 12-JUL-2007 12:38:20.01
Live Time: 0 02:50:02.00 Real Time: 0 02:50:02.00
Batch Id: 0707017A-TH Sample Id: 04
Sample Type: TH

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3985.07	54	0	41.51	158.04	97	100	5.29E-03	13.6	
2	0	4637.24	51	0	50.16	377.41	306	102	5.00E-03	14.0	
3	0	4892.65	145	0	14.38	464.45	408	129	1.42E-02	8.3	
4	0	5388.72	54	0	30.87	635.37	553	105	5.29E-03	13.6	
5	0	5864.24	8	0	319.18	801.62	744	124	7.84E-04	35.4	

Background Counts Within Peak Regions Generated: 12-JUL-2007 15:46:52.52

Live Time: 0 16:40:07.00 Acquisition Start: 6-JUL-2007 15:28:34.01
Real Time: 0 16:40:07.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3952.67	0	0	0.00	146.50	97	100	0.00E+00	0.0	
2	0	4579.07	3	0	153.02	356.50	306	102	5.00E-05	57.7	
3	0	4917.80	2	0	278.50	472.00	408	129	3.33E-05	70.7	
4	0	5302.76	6	0	232.59	605.00	553	105	1.00E-04	40.8	
5	0	5872.78	5	0	0.00	805.50	744	124	8.33E-05	44.7	

Net Sample Counts Within Peak Regions Generated: 12-JUL-2007 15:46:53.43

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3985.07*	54	0	41.51	158.04	97	100	5.29E-03	13.6	
2	0	4637.24*	50	0	50.16	377.41	306	102	4.95E-03	14.2	
3	0	4892.65*	145	0	14.38	464.45	408	129	1.42E-02	8.3	
4	0	5388.72*	53	0	30.87	635.37	553	105	5.19E-03	13.9	
5	0	5864.24*	7	0	319.18	801.62	744	124	7.01E-04	39.9	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 12-JUL-2007 15:46:54

Configuration	: MCA0:[AMSCOUNT]00021072$1		
Analyses by	: ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3		
Sample title	: 5601-FSS-SU3-1014		
Sample date	: 25-MAY-2007 00:00:00	Acquisition date	: 12-JUL-2007 12:38:20
Sample ID	: 04	Sample quantity	: 1.0333 gram
Sample type	: TH	Sample geometry	:
Detector name	: 012	Detector geometry	:
Elapsed live time	: 0 02:50:02.00	Elapsed real time	: 0 02:50:02.00 0.0%
Energy tolerance	: 100.00 keV	Half life ratio	: 8.00
Errors propagated	: Yes	Systematic Error	: 3.00 %
Efficiency type	: Average value	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	3985.07*	54	41.51	158.04	97	100	27.2		TH-232	0.650
0	4637.24*	50	50.16	377.41	306	102	28.3		TH-230	0.609
0	4892.65*	145	14.38	464.45	408	129	16.7		TH229	1.75
0	5388.72*	53	30.87	635.37	553	105	27.8		TH-228	0.670
0	5864.24*	7	319.18	801.62	744	124	79.8		TH-227	8.869E-02

Review of QA results (Daily Pulser Check) 12-JUL-2007 06:05:48 Page 1

Detector	Parameter	Flag	Filename
1	ALL	Passed	D_001_NONE
2	ALL	Passed	D_002_NONE
3	ALL	Passed	D_003_NONE
4	OFFLINE		
5	OFFLINE		
6	ALL	Passed	D_006_NONE
7	OFFLINE		
8	ALL	Passed	D_008_NONE
9	ALL	Passed	D_009_NONE
10	ALL	Passed	D_010_NONE
11	ALL	Passed	D_011_NONE
12	ALL	Passed	D_012_NONE
13	ALL	Passed	D_013_NONE
14	ALL	Passed	D_014_NONE
15	OFFLINE		
16	ALL	Passed	D_016_NONE
17	OFFLINE		
18	ALL	Passed	D_018_NONE
19	ALL	Passed	D_019_NONE
20	OFFLINE		
21	OFFLINE		
22	OFFLINE		
23	ALL	Passed	D_023_NONE
24	OFFLINE		
25	ALL	Passed	D_025_NONE
26	OFFLINE		
27	OFFLINE		
28	ALL	Passed	D_028_NONE
29	ALL	Passed	D_029_NONE
30	ALL	Passed	D_030_NONE
31	ALL	Passed	D_031_NONE
32	OFFLINE		
33	ALL	Passed	D_033_NONE
34	ALL	Passed	D_034_NONE
35	OFFLINE		
36	OFFLINE		
37	ALL	Passed	D_037_NONE
38	ALL	Passed	D_038_NONE
39	OFFLINE		
40	OFFLINE		
41	OFFLINE		
42	ALL	Passed	D_042_NONE
43	OFFLINE		
44	OFFLINE		
45	ALL	Passed	D_045_NONE
46	ALL	Passed	D_046_NONE
47	ALL	Passed	D_047_NONE
48	ALL	Passed	D_048_NONE

APPROVAL DATE: 7.12.07 APPROVAL TIME: _____

APPROVED BY: _____ PROCEDURE # _____

SECTION IX

ANALYTICAL DATA (RADIUM-226)

07-07017
Ra226
Run 1

Work Order	07-07017
Analysis Code	Ra226
Run	1
Date Received	7/5/2007
Lab Deadline	7/26/2007
Client	Environmental Chemical Corporation
Project	Li Tungsten
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	EPA 903.0 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	1481.242
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/05/07 00:00	1.0000E+00
02	MBL	BLANK		07/05/07 00:00	1.0000E+00
03	DUP	5601-FSS-SU3-1014	49	05/25/07 09:45	1.1637E+00
04	DO	5601-FSS-SU3-1014	49	05/25/07 09:45	1.2095E+00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

07-07017
Ra226
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.7056	1045.2	428.3	90.97		0.0242	0.0307	0.0065		90.97	2.34	1.00
02	MBL	0.6986	1034.8	435.3	93.39		0.0239	0.0309	0.0070		93.39	2.50	1.00
03	DUP	0.7008	1038.1	395.3	84.54		0.0242	0.0296	0.0054		84.54	1.91	1.00
04	DO	0.6992	1035.7	410.0	87.88		0.0241	0.0298	0.0057		87.88	2.04	1.00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

07-07017
Ra226
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/06/07 06:46	JBARNARD				
02	MBL			07/06/07 06:46	JBARNARD				
03	DUP			07/06/07 06:46	JBARNARD				
04	DO	07/06/07 08:29	JPACHELLA	07/06/07 06:46	JBARNARD				

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-Ra226-1

Client: Environmental Chemical Corporation
Eberline Services Work Order: 07-07017
Analysis Code: Ra226
Run: 1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-226	LCS	LCS	pCi/g	1.06E+01	1.39E+00	2.16E-01	1.01E+01	104.15	OK		OK	
02	RA-226	MBL	BLANK	pCi/g	5.14E-02	1.01E-01	2.87E-01					OK	INV
03	RA-226	DUP	5601-FSS-SU3-1014	pCi/g	7.71E-01	2.92E-01	2.41E-01				INV	OK	
04	RA-226	DO	5601-FSS-SU3-1014	pCi/g	1.01E+00	3.31E-01	2.21E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-Ra226-1

Client	Eberline Services Work Order	Analysis Code	Run
Environmental Chemical Corporation	07-07017	Ra226	1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-226	LCS	07/05/07 00:00	1.00E+00	90.97		90.97			
02	RA-226	MBL	07/05/07 00:00	1.00E+00	93.39		93.39			
03	RA-226	DUP	05/25/07 09:45	1.16E+00	84.54		84.54			
04	RA-226	DO	05/25/07 09:45	1.21E+00	87.88		87.88			

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-Ra226-1

Run	1
Analysis Code	Ra226
Eberline Services Work Order	07-07017
Client	Environmental Chemical Corporation

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-226	LCS	07/10/07 15:27		A_Spec	1	170.08	7.48 E+02	4.00 E-03	20.6
02	RA-226	MBL	07/10/07 15:28		A_Spec	2	170.02	3.64 E+00	8.00 E-03	20.1
03	RA-226	DUP	07/10/07 15:29		A_Spec	3	170.02	5.72 E+01	1.20 E-02	20
04	RA-226	DO	07/10/07 15:30		A_Spec	6	170.05	8.19 E+01	1.00 E-02	20.1

Count Room Report
Client: Environmental Chemical Co

07-07017-Ra226-1 (pCi/g) in SO
Tracer ID: Ba-6a

1-6

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/05/07 00:00	1.0000	0.7056	1045.1644	428.3000	90.97	2.34	1.00
02	MBL	BLANK	07/05/07 00:00	1.0000	0.6986	1034.7957	435.3000	93.39	2.50	1.00
03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	1.1637	0.7008	1038.0544	395.3000	84.54	1.91	1.00
04	DO	5601-FSS-SU3-1014	05/25/07 09:45	1.2095	0.6992	1035.6844	410.0000	87.88	2.04	1.00

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
07-07017	1	Ra226	7/6/2007 6:42	JBARNARD	JBR	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Ra-226	Ra-5b	44.182	7/6/2007	0.500	0.5090				10.13	0.466	0.00	0.000	0.00	0.000	0.00	0.000

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Ba-133	Ba-6a	1481.242	7/6/2007	0.7056	0.6800
02	Ba-133	Ba-6a	1481.242	7/6/2007	0.6986	0.6800
03	Ba-133	Ba-6a	1481.242	7/6/2007	0.7008	0.6800
04	Ba-133	Ba-6a	1481.242	7/6/2007	0.6992	0.6800

Balance Printer Tapes

Tracer

0.7056 g
0.6986 g
0.7008 g
0.6992 g

LCS

0.5090 g
0.4082 g

Matrix Spike

Eberline Services - Oak Ridge
Version 2.0 8/1999

Aliquot Worksheet

Printed: 7/6/2007 9:00 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
07-07017	1	Ra226	grams	7/26/2007	JBARNARD

Lab Fraction	Environmental Chemical Corporation Client ID	Sample Type	Muffle Data Ratio Post/Pre	Dilution Data No of Dils	Dil Factor	Ratio	Aliquot Data Aliquot	Net Equiv	MS Aliquot Data Aliquot	Net Equiv	H-3 Solids Only Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	5601-FSS-SU3-1014	DUP					1.1637E+00	1.1637E+00				
04	5601-FSS-SU3-1014	DO					1.2095E+00	1.2095E+00				

Comments	
	1.1637 g 1.2095 g

Technician: JBarnard Date: 7/6/07

Eberline Services - Oak Ridge
Version 1.0 9/1999

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
07-07017	1	Ra226			DJOHNSON

TRetec	Environmental Chemical Corporation	Sample	Carrier Data	Filter Data			Gravimetric
Fraction	Client ID	Type	Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS		0.0242	0.0307	0.0065	
02	BLANK	MBL		0.0239	0.0309	0.0070	
03	DUP	DUP		0.0242	0.0296	0.0054	
04	5601-FSS-SU3-1014	DO		0.0241	0.0298	0.0057	

Technician: _____ Date: 7/10/07

Eberline Services - Oak Ridge
Prep Logbook
Version 2.0 8/1999

Rough Sample Preparation Log Book

Printed: 7/6/2007 8:29 AM

Work Order	Lab Deadline	Date Received in Prep	Date Sealed	Date Returned	Technician
07-07017	7/26/2007	7/5/2007	7/6/2007	7/7/2007	JPACHELLA

Eberline	Environmental Chemical Corporation	Tare (g)	Gross (g)		Net (g)		Percent		Gamma		Special
Fraction	Client ID	Pan Wt	Wet Wt.	Dry Wt.	Wet Wt.	Dry Wt.	Liquid	Solid	Dry Wt.	LEPS Wt.	Info
04	5601-FSS-SU3-1014	28.4000	1894.6500	1555.1600	1866.2500	1526.7600	18.19%	81.81%			

Comments	
Special Codes	H: Hot, O: Organic Hazard, P: PCB Hazard, R: Rush, T: Other (see comments)

Technician: JPachella

Date: 7-6-07

Analysis: Rough Prep Logbook

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
11-JUL-2007 10:33:46

****

Spectral File: ND_AMS_ARCHIVE_C:C_0707017A-RA$01_RA.CNF

****

BATCH ID:	0707017A-RA	SAMPLE ID:	01
SAMPLE DATE:	5-JUL-2007 00:00	ALIQUOT: 1.000E+00	gram
SAMPLE TITLE:	SPIKE	DETECTOR NUMBER:	001
ACQ DATE:	10-JUL-2007 15:27	AVERAGE EFFICIENCY:	20.64%
ELAPSED LIVE TIME:	10205.	RECOVERY:	90.97%
TRACER ID:	NONE	TRACER FWHM (kev):	0.00
LAMBDA VALUE:	0.	ROI TYPE:	MANUAL
TRACER DPM AT SAMPLE DATE:	0.000	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 07:08	EFF CAL DATE: 6-JUL-2007	07:08
BKG FILENAME:	B_001_6JUL07	BKG ELAPSED TIME:	60002.
		SAF:	2.34

****

NUCLIDE ACTIVITY SUMMARY

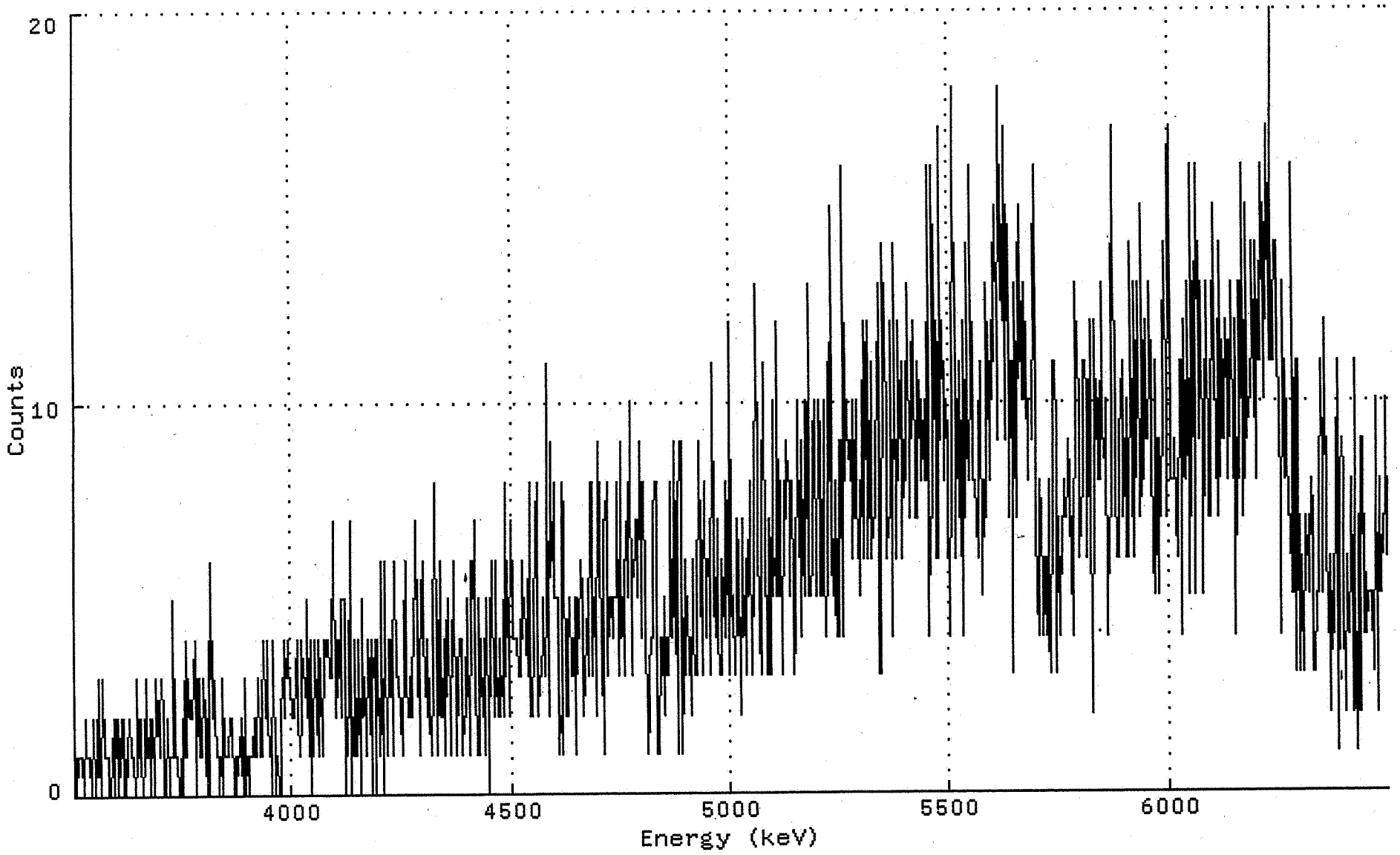
NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
PO-218	6003.0	3497.07	3.57	100.0	4.935E+01	4.279E+00	3.797E-01
RN-222	5490.0	3267.79	1.19	99.9	4.614E+01	4.050E+00	2.572E-01
RA-226	4785.0	748.12	0.68	100.0	1.055E+01	1.391E+00	2.161E-01

****

Analyst _____ Date 7/11/07

Reviewer _____ Date 7/11/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.C]C_0707017A-RA$01_RA.CNF;2
Title : 001
Sample Title: SPIKE
Start Time: 10-JUL-2007 15:27 Sample Time: 5-JUL-2007 00:00: Energy Offset: 3.49562E+03
Real Time : 0 02:50:05.00 Sample ID : 01 Energy Slope : 3.07220E+00
Live Time : 0 02:50:05.00 Sample Type: RA Energy Quad : -1.39464E-04



Channel Contents for ND_AMS_ARCHIVE_C:C_0707017A-RA$01_RA

Channel

1:	10205	10205	1	1	0	1	1	1	1	0	2	1	1	1
15:	0	0	2	0	0	1	3	1	0	3	1	1	1	1
29:	0	0	1	2	0	2	2	0	1	2	0	2	0	1
43:	1	2	1	1	1	0	1	3	1	2	1	0	1	3
57:	1	1	2	0	2	0	0	3	2	1	2	3	2	0
71:	0	2	0	1	1	1	5	1	1	1	0	0	2	0
85:	2	4	1	3	2	2	2	3	4	0	3	1	3	1
99:	3	2	1	0	4	0	6	2	4	2	1	1	0	1
113:	0	3	1	1	1	1	2	2	2	0	1	0	1	1
127:	2	1	0	3	0	1	0	1	1	1	2	1	1	3
141:	3	1	1	2	4	2	4	2	1	1	0	4	0	1
155:	1	0	0	2	3	2	4	3	4	3	3	2	2	2
169:	3	4	2	1	2	4	3	3	2	5	2	0	4	1
183:	4	4	2	1	4	3	1	4	3	4	4	4	3	3
197:	3	7	2	3	4	4	2	5	5	5	0	2	2	7
211:	0	2	1	4	1	2	4	0	5	2	3	1	4	4
225:	3	0	4	3	4	0	4	1	2	6	0	6	4	1
239:	4	3	4	1	3	6	3	3	3	2	1	1	4	6
253:	3	2	2	3	2	5	5	7	4	1	3	5	6	4
267:	3	2	4	2	1	3	3	8	3	1	3	6	2	2
281:	4	1	4	5	1	2	4	5	6	1	3	3	4	4
295:	1	2	2	5	4	1	5	6	5	7	3	1	1	5
309:	3	2	4	1	5	1	0	5	5	6	2	6	3	2
323:	4	2	3	2	8	3	6	2	3	7	5	4	4	4
337:	4	3	3	6	4	5	4	4	3	8	2	2	4	4
351:	7	8	2	3	3	4	5	3	5	11	2	9	8	6
365:	8	5	5	5	1	2	1	8	7	2	2	4	5	3
379:	4	3	5	1	5	4	4	6	5	2	3	4	5	3
393:	8	8	3	5	5	2	9	7	6	4	1	7	7	8
407:	3	5	5	4	5	5	5	8	3	9	4	5	3	6
421:	6	8	5	10	3	5	6	6	7	5	9	4	8	8
435:	5	5	1	2	3	4	4	7	8	8	1	1	4	4
449:	4	2	5	3	3	5	8	4	5	9	6	1	7	9
463:	9	1	3	6	3	5	3	4	2	6	4	3	3	4
477:	9	6	3	5	8	4	5	6	5	3	11	6	5	4
491:	7	4	3	3	6	5	4	8	7	3	12	5	4	5
505:	3	5	7	6	2	7	4	5	3	6	5	8	7	3
519:	6	6	13	7	7	4	3	7	11	5	7	3	3	7
533:	3	10	5	6	5	12	5	5	8	3	8	7	9	8
547:	8	5	8	5	3	4	10	8	8	4	9	6	5	10
561:	7	13	5	5	6	9	10	5	5	10	9	5	5	10
575:	6	4	6	11	8	15	6	5	8	5	4	9	4	9
589:	4	16	8	10	9	9	8	10	6	8	10	8	6	8
603:	5	9	12	6	11	12	6	8	11	6	7	7	9	10
617:	13	3	3	14	13	13	8	6	7	7	12	4	14	11
631:	6	12	8	10	11	6	9	8	9	13	7	7	11	12
645:	12	7	7	11	10	8	10	9	8	10	8	16	4	7
659:	7	16	13	6	12	6	17	9	12	10	8	10	9	8
673:	4	9	8	18	10	6	10	7	11	8	4	12	7	14
687:	9	8	11	16	8	8	8	7	6	9	11	5	5	8
701:	7	13	11	8	11	10	14	11	15	11	9	18	14	13
715:	12	17	9	15	14	7	11	11	3	13	10	7	14	11
729:	15	10	10	13	11	8	10	10	10	9	13	16	7	5
743:	4	8	7	5	4	5	6	4	8	4	3	8	11	11
757:	9	3	7	5	4	7	7	8	7	8	9	8	5	7
771:	4	12	13	11	10	6	7	8	11	11	10	6	9	12
785:	9	2	9	12	9	10	8	8	13	9	9	8	10	4
799:	5	6	8	11	17	7	8	6	6	9	10	11	7	9
813:	6	10	6	12	14	7	13	6	10	13	12	7	8	15
827:	8	12	9	9	11	13	10	9	6	5	11	7	5	9
841:	7	10	11	14	9	7	16	17	8	8	8	9	7	6
855:	6	11	11	4	12	8	8	13	12	5	16	7	13	5
869:	11	16	9	14	12	8	5	10	12	13	7	7	11	11
883:	15	12	8	12	7	9	14	9	11	9	12	11	8	10
897:	13	13	8	12	4	9	8	13	13	7	16	8	15	9
911:	10	10	10	12	14	11	8	14	11	12	11	16	10	15
925:	12	17	16	11	20	11	11	12	14	14	12	9	8	4
939:	13	8	11	9	7	7	7	5	16	5	11	3	7	11
953:	3	6	5	3	7	6	6	7	5	8	7	3	3	5
967:	5	5	7	11	8	5	12	6	7	4	6	2	5	5
981:	4	8	11	1	6	8	9	8	5	2	6	5	4	6
995:	8	2	11	3	1	7	2	2	9	9	4	7	4	5
1009:	5	5	5	5	3	7	10	3	2	8	5	5	7	7
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 11-JUL-2007 10:33:39.41

Detector ID: 1 Acquisition Start: 10-JUL-2007 15:27:15.01
Live Time: 0 02:50:05.00 Real Time: 0 02:50:05.00
Batch Id: 0707017A-RA Sample Id: 01
Sample Type: RA

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4748.23	320	0181.00		415.56	385	61	3.14E-02	5.6	
2	0	5299.02	1397	0495.34		603.54	508	176	1.37E-01	2.7	
3	0	5809.12	1496	0	0.00	780.71	702	162	1.47E-01	2.6	

Background Counts Within Peak Regions Generated: 11-JUL-2007 10:33:44.69

Acquisition Start: 6-JUL-2007 15:27:59.01
Live Time: 0 16:40:02.00 Real Time: 0 16:40:02.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4746.29	4	0	88.46	415.00	385	61	6.67E-05	50.0	
2	0	5276.30	7	0402.65		595.50	508	176	1.17E-04	37.8	
3	0	5817.65	21	0213.52		782.50	702	162	3.50E-04	21.8	

Net Sample Counts Within Peak Regions Generated: 11-JUL-2007 10:33:45.03

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4748.23*	748	0181.00		415.56	385	61	7.33E-02	5.6	
2	0	5299.02*	3268	0495.34		603.54	508	176	3.20E-01	2.7	
3	0	5809.12*	3497	0	0.00	780.71	702	162	3.43E-01	2.6	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 11-JUL-2007 10:33:46

Configuration : MCA0:[AMSCOUNT]0000B288$1
Analyses by : ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3
Sample title : SPIKE
Sample date : 5-JUL-2007 00:00:00
Sample ID : 01
Sample type : RA
Detector name : 001
Elapsed live time: 0 02:50:05.00
Energy tolerance : 150.00 keV
Errors propagated: Yes
Efficiency type : Average value
Abundance limit : 75.00

Acquisition date : 10-JUL-2007 15:27:15
Sample quantity : 1.0000 gram
Sample geometry :
Detector geometry:
Elapsed real time: 0 02:50:05.00 0.0%
Half life ratio : 8.00
Systematic Error : 3.00 %
Efficiencies at : Peak Energy

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	4748.23*	748181.00		415.56	385	61	11.2		RA-226	9.60
0	5299.02*	3268495.34		603.54	508	176	5.4		RN-222	42.0
0	5809.12*	3497	0.00	780.71	702	162	5.2		PO-218	44.9

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
10-JUL-2007 19:58:12

****

Spectral File: ND_AMS_ARCHIVE_R:R_0707017A-RA$02_RA.CNF

****

BATCH ID:	0707017A-RA	SAMPLE ID:	02
SAMPLE DATE:	10-JUL-2007 00:00	ALIQUOT:	1.000E+00 gram
SAMPLE TITLE:	BLANK	DETECTOR NUMBER:	002
ACQ DATE:	10-JUL-2007 15:28	AVERAGE EFFICIENCY:	20.10%
ELAPSED LIVE TIME:	10201.	RECOVERY:	93.39%
TRACER ID:	NONE	TRACER FWHM (kev):	0.00
LAMBDA VALUE:	0.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	0.000	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 07:08	EFF CAL DATE:	6-JUL-2007 07:08
BKG FILENAME:	B_002_6JUL07	BKG ELAPSED TIME:	60007.
		SAF:	2.50

****

NUCLIDE ACTIVITY SUMMARY

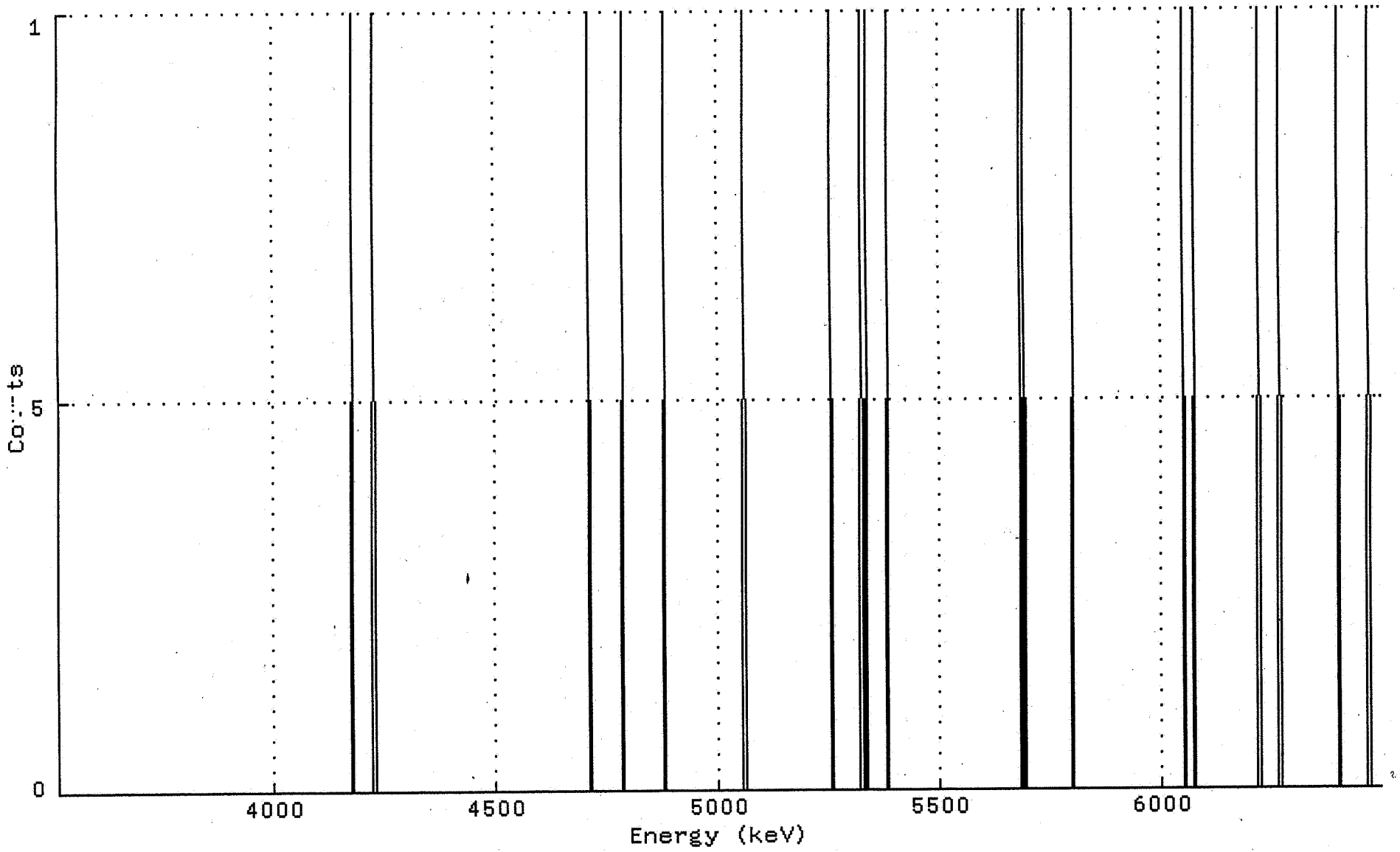
NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
PO-218	6003.0	6.31	1.19	100.0	8.908E-02	1.231E-01	2.747E-01
RN-222	5490.0	11.31	1.19	99.9	1.598E-01	1.588E-01	2.748E-01
RA-226	4785.0	3.64	1.36	100.0	5.138E-02	1.008E-01	2.870E-01

****

Analyst jet 7/10/07 Date

Reviewer [signature] 7/11/07 Date

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.R]R_0707017A-RA$02_RA.CNF;1
Title : 002
Sample Title: BLANK
Start Time: 10-JUL-2007 15:28 Sample Time: 10-JUL-2007 00:00 Energy Offset: 3.50621E+03
Real Time : 0 02:50:01.00 Sample ID : 02 Energy Slope : 3.05374E+00
Live Time : 0 02:50:01.00 Sample Type: RA Energy Quad : -1.38508E-04



Channel Contents for ND_AMS_ARCHIVE_R:R_0707017A-RA$02_RA

Channel														
1:	10201	10201	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
197:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
211:	0	0	0	0	0	0	0	0	0	0	0	1	0	0
225:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
239:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
253:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
267:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
295:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
309:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
323:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
351:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
365:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
379:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
407:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
421:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
435:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
463:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
477:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
491:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
519:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
533:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
547:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
575:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
589:	1	0	0	0	0	0	0	0	0	0	0	0	0	0
603:	0	0	0	0	0	0	0	0	0	1	0	0	0	1
617:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
631:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
645:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
659:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
687:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
701:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
715:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0	1	0	0	1	0	0
743:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
757:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
771:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
799:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
813:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
827:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855:	0	0	0	0	0	0	0	0	0	0	0	1	0	0
869:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
883:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
911:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
925:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
939:	0	0	0	0	1	0	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
967:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
981:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 10-JUL-2007 19:57:31.15

Detector ID: 2 Acquisition Start: 10-JUL-2007 15:28:08.01
Live Time: 0 02:50:01.00 Real Time: 0 02:50:01.00
Batch Id: 0707017A-RA Sample Id: 02
Sample Type: RA

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4748.19	2	0	79.40	414.50	288	157	1.96E-04	70.7	
2	0	5271.26	5	0	342.02	594.00	507	177	4.90E-04	44.7	
3	0	5723.35	3	0	128.26	751.67	703	163	2.94E-04	57.7	

Background Counts Within Peak Regions Generated: 10-JUL-2007 19:58:09.00

Acquisition Start: 6-JUL-2007 15:28:03.01
Live Time: 0 16:40:07.00 Real Time: 0 16:40:07.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4604.80	8	0	3.06	366.00	288	157	1.33E-04	35.4	
2	0	5273.98	7	0	502.08	595.00	507	177	1.17E-04	37.8	
3	0	5814.82	7	0	251.04	784.00	703	163	1.17E-04	37.8	

Net Sample Counts Within Peak Regions Generated: 10-JUL-2007 19:58:09.40

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4748.19*	4	0	79.40	414.50	288	157	3.57E-04	98.0	
2	0	5271.26*	11	0	342.02	594.00	507	177	1.11E-03	49.6	
3	0	5723.35*	6	0	128.26	751.67	703	163	6.19E-04	69.0	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 10-JUL-2007 19:58:10

Configuration	: MCA0:[AMSCOUNT]00021072$1		
Analyses by	: ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3		
Sample title	: BLANK		
Sample date	: 10-JUL-2007 00:00:00	Acquisition date	: 10-JUL-2007 15:28:08
Sample ID	: 02	Sample quantity	: 1.0000 gram
Sample type	: RA	Sample geometry	:
Detector name	: 002	Detector geometry	:
Elapsed live time	: 0 02:50:01.00	Elapsed real time	: 0 02:50:01.00 0.0%
Energy tolerance	: 100.00 keV	Half life ratio	: 8.00
Errors propagated	: Yes	Systematic Error	: 3.00 %
Efficiency type	: Average value	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	4748.19*	4	79.40	414.50	288	157196.0			RA-226	4.798E-02
0	5271.26*	11342.02		594.00	507	177	99.2		RN-222	0.149
0	5723.35*	6128.26		751.67	703	163138.0			PO-218	8.319E-02

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
10-JUL-2007 20:06:30

****

Spectral File: ND_AMS_ARCHIVE_S:S_0707017A-RA$03_RA.CNF

****

BATCH ID:	0707017A-RA	SAMPLE ID:	03
SAMPLE DATE:	25-MAY-2007 00:00	ALIQUOT: 1.164E+00	gram
SAMPLE TITLE:	5601-FSS-SU3-1014	DETECTOR NUMBER:	003
ACQ DATE:	10-JUL-2007 15:29	AVERAGE EFFICIENCY:	19.98%
ELAPSED LIVE TIME:	10201.	RECOVERY:	84.54%
TRACER ID:	NONE	TRACER FWHM (kev):	0.00
LAMBDA VALUE:	0.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	0.000	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 07:08	EFF CAL DATE: 6-JUL-2007	07:08
BKG FILENAME:	B_003_6JUL07	BKG ELAPSED TIME:	60004.
		SAF:	1.91

****

NUCLIDE ACTIVITY SUMMARY

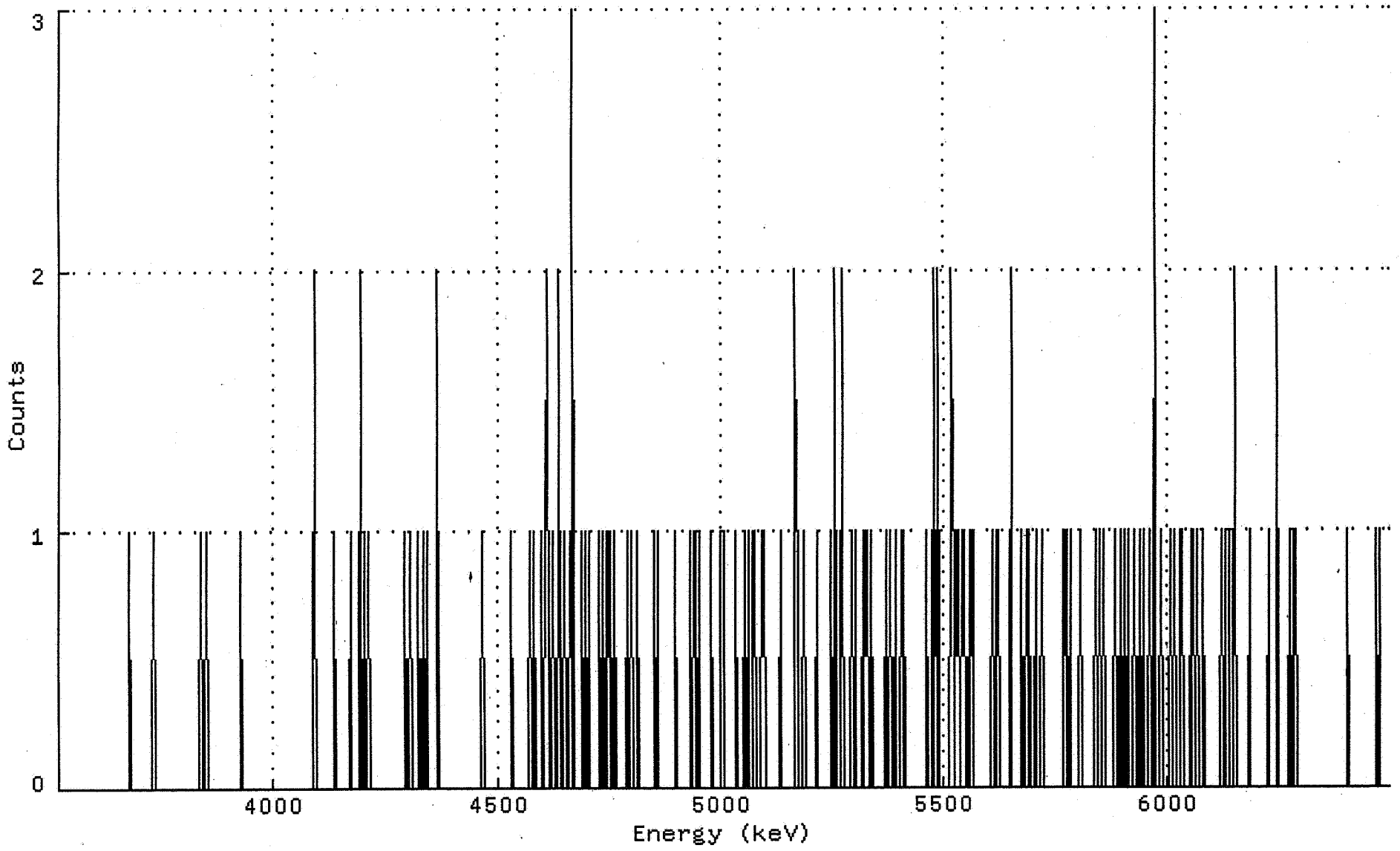
NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
PO-218	6003.0	66.89	1.87	100.0	9.017E-01	3.156E-01	2.335E-01
RN-222	5490.0	83.23	2.72	99.9	1.123E+00	3.548E-01	2.674E-01
RA-226	4785.0	57.17	2.04	100.0	7.705E-01	2.920E-01	2.407E-01

****

Analyst _____ Date 7/10/07

Reviewer _____ Date 7/11/07

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.S]S_0707017A-RA$03_RA.CNF;1
Title : 003
Sample Title: 5601-FSS-SU3-1014
Start Time: 10-JUL-2007 15:29 Sample Time: 25-MAY-2007 00:00 Energy Offset: 3.50617E+03
Real Time : 0 02:50:01.00 Sample ID : 03 Energy Slope : 3.06617E+00
Live Time : 0 02:50:01.00 Sample Type: RA Energy Quad : -1.42012E-04



Channel Contents for ND_AMS_ARCHIVE_S:S_0707017A-RA$03_RA

Channel

1:	10201	10201	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43:	0	0	0	0	0	0	0	0	0	0	0	0	1	0
57:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
85:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99:	0	0	0	0	0	0	0	0	0	1	0	0	0	1
113:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127:	0	0	0	0	0	0	0	0	0	0	0	1	0	0
141:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183:	0	0	0	0	0	0	0	0	0	2	1	0	0	0
197:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
211:	0	0	0	0	0	0	0	0	1	0	0	0	0	0
225:	0	2	0	0	1	0	0	1	0	0	0	0	0	0
239:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
253:	0	0	0	0	0	0	0	1	0	0	1	1	0	0
267:	0	0	0	1	0	0	1	0	0	1	0	0	0	0
281:	0	0	0	2	0	0	0	0	0	0	0	0	0	0
295:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
309:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
323:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
337:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
351:	0	0	0	1	0	0	1	0	0	0	0	0	1	0
365:	1	1	2	0	0	0	1	0	0	0	1	2	0	0
379:	0	1	0	0	0	1	0	3	0	0	0	0	0	0
393:	1	0	0	1	0	1	0	0	0	0	0	0	0	1
407:	0	0	1	0	1	0	1	0	1	0	0	1	0	0
421:	0	0	0	0	0	0	1	0	0	1	1	0	0	0
435:	1	0	0	0	0	0	0	0	0	0	0	0	0	1
449:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
463:	0	1	0	0	0	0	0	0	0	0	0	0	0	1
477:	0	1	1	0	0	1	0	0	0	0	0	0	0	0
491:	0	1	0	0	0	0	0	0	1	1	1	0	0	0
505:	0	0	0	0	0	0	1	0	0	0	0	0	1	0
519:	0	1	0	0	0	1	1	0	0	0	0	0	1	1
533:	0	0	0	0	0	0	0	0	0	0	0	0	1	0
547:	0	0	0	0	0	0	0	0	0	2	1	1	0	0
561:	0	0	1	0	0	0	0	0	0	0	0	0	1	0
575:	0	0	0	0	0	0	0	0	0	1	0	0	2	0
589:	0	0	0	2	1	0	0	0	0	0	0	1	0	1
603:	0	0	0	0	0	1	0	1	1	1	0	0	1	0
617:	0	0	0	0	0	0	0	0	0	1	0	0	1	1
631:	0	0	1	0	0	0	0	1	0	1	0	0	0	0
645:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
659:	0	0	0	0	2	0	1	0	2	0	0	0	0	0
673:	0	0	0	1	2	1	1	0	1	1	1	0	1	1
687:	1	0	0	0	1	0	1	1	0	0	0	0	0	0
701:	0	0	0	0	0	0	0	0	1	1	0	0	1	1
715:	0	0	0	0	0	0	0	0	0	2	0	0	0	0
729:	0	0	0	1	0	0	0	1	0	1	0	0	0	0
743:	1	0	0	0	0	1	0	0	0	0	0	0	0	0
757:	0	0	0	0	0	0	0	0	1	1	0	1	0	1
771:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
785:	0	0	0	0	0	1	0	0	1	0	0	1	0	0
799:	0	0	0	0	0	0	1	0	0	0	1	0	0	1
813:	0	0	1	0	0	0	0	1	0	0	0	1	0	0
827:	1	0	0	0	0	1	0	0	0	3	0	0	0	0
841:	1	1	0	0	0	0	0	0	1	0	0	1	0	0
855:	0	0	1	1	0	0	0	0	0	0	1	0	1	0
869:	0	1	0	0	0	0	1	0	0	0	0	0	0	0
883:	0	0	0	0	0	0	1	1	0	0	1	1	1	0
897:	0	0	0	2	1	0	0	0	0	0	0	0	0	0
911:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
925:	0	0	1	0	0	0	0	0	0	2	0	0	0	0
939:	0	0	0	0	0	1	0	0	1	0	1	0	0	0
953:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
967:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
981:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
995:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	1	0	1	0	0	0	0	0	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 10-JUL-2007 19:58:20.40

Detector ID: 3 Acquisition Start: 10-JUL-2007 15:29:20.01
Live Time: 0 02:50:01.00 Real Time: 0 02:50:01.00
Batch Id: 0707017A-RA Sample Id: 03
Sample Type: RA

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4671.70	31	0	61.32	387.06	287	157	3.04E-03	18.0	
2	0	5308.13	45	0	375.51	604.62	506	176	4.41E-03	14.9	
3	0	5834.13	36	0	345.71	788.00	700	163	3.53E-03	16.7	

Background Counts Within Peak Regions Generated: 10-JUL-2007 20:06:27.80

Acquisition Start: 6-JUL-2007 15:28:06.01
Live Time: 0 16:40:04.00 Real Time: 0 16:40:04.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4604.49	12	0	0.00	365.00	287	157	2.00E-04	28.9	
2	0	5273.69	16	0	3.08	593.50	506	176	2.67E-04	25.0	
3	0	5810.19	11	0	311.46	781.00	700	163	1.83E-04	30.2	

Net Sample Counts Within Peak Regions Generated: 10-JUL-2007 20:06:28.22

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4671.70*	57	0	61.32	387.06	287	157	5.60E-03	18.6	
2	0	5308.13*	83	0	375.51	604.62	506	176	8.16E-03	15.4	
3	0	5834.13*	67	0	345.71	788.00	700	163	6.56E-03	17.2	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 10-JUL-2007 20:06:29

Configuration	: MCA0:[AMSCOUNT]00021072$1		
Analyses by	: ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3		
Sample title	: 5601-FSS-SU3-1014		
Sample date	: 25-MAY-2007 00:00:00	Acquisition date	: 10-JUL-2007 15:29:20
Sample ID	: 03	Sample quantity	: 1.1637 gram
Sample type	: RA	Sample geometry	:
Detector name	: 003	Detector geometry	:
Elapsed live time	: 0 02:50:01.00	Elapsed real time	: 0 02:50:01.00 0.0%
Energy tolerance	: 100.00 keV	Half life ratio	: 8.00
Errors propagated	: Yes	Systematic Error	: 3.00 %
Efficiency type	: Average value	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	4671.70*	57	61.32	387.06	287	157	37.3		RA-226	0.651
0	5308.13*	83375.51		604.62	506	176	30.8		RN-222	0.949
0	5834.13*	67345.71		788.00	700	163	34.3		PO-218	0.762

Eberline Services
Oak Ridge Laboratory

ALPHA SPECTROMETRY REPORT
10-JUL-2007 20:06:58

Spectral File: ND_AMS_ARCHIVE_S:S_0707017A-RA$04_RA.CNF

BATCH ID:	0707017A-RA	SAMPLE ID:	04
SAMPLE DATE:	25-MAY-2007 00:00	ALIQUOT: 1.209E+00	gram
SAMPLE TITLE:	5601-FSS-SU3-1014	DETECTOR NUMBER:	006
ACQ DATE:	10-JUL-2007 15:30	AVERAGE EFFICIENCY:	20.15%
ELAPSED LIVE TIME:	10203.	RECOVERY:	87.88%
TRACER ID:	NONE	TRACER FWHM (kev):	0.00
LAMBDA VALUE:	0.	ROI TYPE:	STANDARD
TRACER DPM AT SAMPLE DATE:	0.000	CONFIDENCE FACTOR:	4.65
SAMPLE MATRIX:	SOIL	LLD CONSTANT:	2.71
ENERGY CAL DATE:	6-JUL-2007 07:08	EFF CAL DATE: 6-JUL-2007	07:08
BKG FILENAME:	B_006_6JUL07	BKG ELAPSED TIME:	60000.
		SAF:	2.04

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ gram	TPU/ERROR 2-SIGMA	MDC pCi/ gram
PO-218	6003.0	85.51	2.21	100.0	1.058E+00	3.395E-01	2.429E-01
RN-222	5490.0	106.42	1.70	99.9	1.318E+00	3.792E-01	2.216E-01
RA-226	4785.0	81.94	1.70	100.0	1.014E+00	3.310E-01	2.214E-01

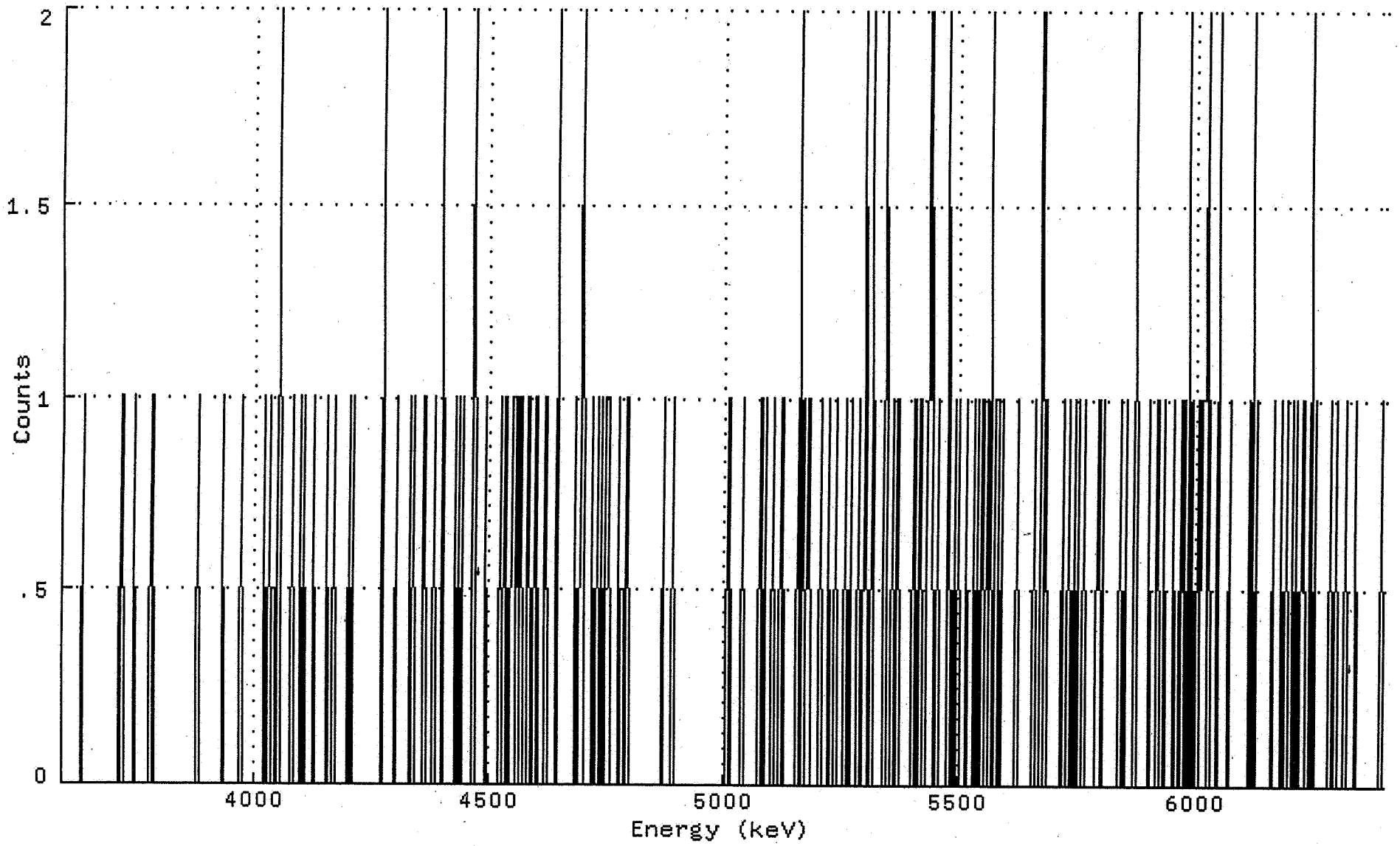
JPT
Analyst

7/10/07
Date

Reviewer

7/11/07
Date

Spectrum : DKA100:[ALPHA.ALUSR.ARCHIVE.S]S_0707017A-RA$04_RA.CNF;1
Title : 006
Sample Title: 5601-FSS-SU3-1014
Start Time: 10-JUL-2007 15:30 Sample Time: 25-MAY-2007 00:00 Energy Offset: 3.58248E+03
Real Time : 0 02:50:03.00 Sample ID : 04 Energy Slope : 2.87185E+00
Live Time : 0 02:50:03.00 Sample Type: RA Energy Quad : -1.17219E-04



Channel Contents for ND_AMS_ARCHIVE_S:S_0707017A-RA$04_RA

Channel

1:	10203	10203	0	0	0	0	0	0	0	0	0	0	0	0
15:	0	0	0	1	0	0	0	0	0	0	0	0	0	0
29:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43:	0	0	0	1	0	1	0	0	0	0	0	0	0	0
57:	1	0	0	0	0	0	0	0	0	0	0	0	1	0
71:	1	0	0	0	0	0	0	0	0	0	0	0	0	0
85:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
127:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
141:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
155:	0	0	0	1	0	0	0	0	1	0	2	0	0	0
169:	0	0	0	0	0	0	1	0	0	0	0	0	1	0
183:	0	1	0	0	0	0	0	0	1	0	0	0	0	0
197:	0	0	0	0	1	0	0	0	0	1	0	0	0	0
211:	0	0	0	0	0	0	1	0	0	1	0	0	0	0
225:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
239:	0	0	0	0	2	0	0	0	0	0	0	0	0	0
253:	1	0	0	0	0	0	0	0	0	0	0	1	0	1
267:	0	0	0	0	0	0	0	1	1	0	0	0	0	0
281:	0	1	0	0	0	0	0	2	0	0	0	0	0	0
295:	0	0	0	1	0	0	1	0	1	0	0	0	0	0
309:	0	0	1	2	0	0	0	0	0	0	0	0	1	0
323:	0	0	0	0	0	0	0	0	0	1	0	0	1	0
337:	1	0	0	0	1	1	1	0	1	0	1	1	0	0
351:	0	0	1	1	0	0	0	1	0	1	0	0	0	0
365:	0	1	1	0	0	0	0	0	0	0	2	0	0	0
379:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
393:	1	2	0	0	0	0	0	0	0	1	0	0	0	1
407:	0	0	1	0	0	1	1	1	1	0	0	0	0	0
421:	0	1	0	0	0	0	1	0	1	0	0	0	0	0
435:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	1	0	0	0	0	0	0
463:	0	1	0	0	0	0	0	0	0	0	0	0	0	0
477:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
491:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
505:	0	1	0	1	0	0	0	0	0	0	0	0	0	1
519:	0	0	0	0	0	0	0	0	0	0	0	0	1	1
533:	0	0	1	0	0	0	0	0	1	0	0	0	0	0
547:	1	0	1	0	0	0	0	0	0	0	0	0	0	1
561:	0	2	0	1	1	0	1	1	1	0	0	0	0	0
575:	0	0	0	1	0	0	0	0	0	1	0	0	0	0
589:	1	1	0	0	0	0	0	0	1	0	0	0	1	0
603:	0	0	0	0	1	0	0	0	1	2	1	0	0	0
617:	1	2	0	0	0	0	0	0	0	0	0	2	1	0
631:	0	0	0	1	0	1	0	1	0	0	0	0	0	0
645:	0	0	0	0	0	1	1	0	0	1	0	1	0	0
659:	0	0	0	2	1	2	1	0	0	0	1	0	0	0
673:	0	0	0	0	2	1	0	0	0	1	0	0	1	1
687:	0	0	0	0	0	1	0	0	0	0	1	0	0	0
701:	1	0	1	0	1	0	0	1	0	2	1	0	0	1
715:	1	1	0	0	1	0	0	0	0	0	0	0	0	0
729:	0	0	1	1	0	0	0	0	0	0	0	0	0	0
743:	0	0	1	0	0	0	0	2	2	0	1	1	0	0
757:	0	0	0	0	0	0	0	0	0	0	1	0	0	0
771:	0	1	0	0	0	1	0	0	1	0	0	0	0	1
785:	0	0	0	0	0	0	0	0	0	1	1	1	0	1
799:	0	0	0	0	0	0	0	0	0	0	0	0	0	1
813:	0	0	0	1	0	0	0	0	0	0	0	2	0	0
827:	0	0	0	0	0	0	0	0	1	0	0	0	0	0
841:	1	1	0	0	0	0	1	0	0	0	0	0	0	0
855:	1	0	0	0	0	1	0	1	0	1	0	0	2	0
869:	0	1	0	0	0	1	1	0	1	1	1	1	2	0
883:	1	0	0	0	0	0	0	2	0	0	0	0	0	0
897:	0	0	1	0	0	0	0	0	0	0	0	0	0	0
911:	0	0	0	0	1	0	2	0	0	1	0	0	0	0
925:	0	0	0	0	0	0	0	0	0	1	0	0	0	0
939:	0	0	1	0	0	0	1	0	0	0	0	1	0	0
953:	1	0	0	0	1	1	1	0	0	0	0	2	0	0
967:	1	0	0	0	0	0	0	0	0	0	0	0	0	1
981:	0	0	0	1	1	0	0	0	0	0	0	1	0	0
995:	0	0	0	0	0	1	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0	0	0	0	1	0
1023:	0	0												

Eberline Services
Oak Ridge Laboratory

Gross Sample Counts Within Peak Regions Generated: 10-JUL-2007 20:06:36.55

Detector ID: 6
Live Time: 0 02:50:03.00
Batch Id: 0707017A-RA
Sample Type: RA

Acquisition Start: 10-JUL-2007 15:30:01.01
Real Time: 0 02:50:03.00
Sample Id: 04

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4597.96	41		0307.29	358.85	279	167	4.02E-03	15.6	
2	0	5301.86	53		0334.57	614.09	511	187	5.19E-03	13.7	
3	0	5848.04	43		0378.72	816.07	718	172	4.21E-03	15.2	

Background Counts Within Peak Regions Generated: 10-JUL-2007 20:06:55.63

Live Time: 0 16:40:00.00

Acquisition Start: 6-JUL-2007 15:28:17.01
Real Time: 0 16:40:00.00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4604.16	10	0	2.88	362.00	279	167	1.67E-04	31.6	
2	0	5271.18	10		0339.51	604.00	511	187	1.67E-04	31.6	
3	0	5810.03	13		0302.11	803.50	718	172	2.17E-04	27.7	

Net Sample Counts Within Peak Regions Generated: 10-JUL-2007 20:06:56.11

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4597.96*	82		0307.29	358.85	279	167	8.03E-03	16.0	
2	0	5301.86*	106		0334.57	614.09	511	187	1.04E-02	14.0	
3	0	5848.04*	86		0378.72	816.07	718	172	8.38E-03	15.7	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.0 Generated 10-JUL-2007 20:06:57

Configuration	: MCA0:[AMSCOUNT]00021072$1		
Analyses by	: ROIPEAK V1.2,PEAKEFF V2.2,ENBACK V1.6,NID V3.3		
Sample title	: 5601-FSS-SU3-1014		
Sample date	: 25-MAY-2007 00:00:00	Acquisition date	: 10-JUL-2007 15:30:01
Sample ID	: 04	Sample quantity	: 1.2095 gram
Sample type	: RA	Sample geometry	:
Detector name	: 006	Detector geometry	:
Elapsed live time	: 0 02:50:03.00	Elapsed real time	: 0 02:50:03.00 0.0%
Energy tolerance	: 100.00 keV	Half life ratio	: 8.00
Errors propagated	: Yes	Systematic Error	: 3.00 %
Efficiency type	: Average value	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Post-NID Peak Search Report

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity pCi/gram
0	4597.96*	82307.29	358.85	279	167		31.9		RA-226	0.891
0	5301.86*	106334.57	614.09	511	187		27.9		RN-222	1.16
0	5848.04*	86378.72	816.07	718	172		31.3		PO-218	0.930

Review of QA results (Daily Pulser Check) 10-JUL-2007 07:09:08 Page 1

Detector	Parameter	Flag	Filename
1	ALL	Passed	D_001_NONE
2	ALL	Passed	D_002_NONE
3	ALL	Passed	D_003_NONE
4	OFFLINE		
5	OFFLINE		
6	ALL	Passed	D_006_NONE
7	OFFLINE		
8	ALL	Passed	D_008_NONE
9	ALL	Passed	D_009_NONE
10	ALL	Passed	D_010_NONE
11	ALL	Passed	D_011_NONE
12	ALL	Passed	D_012_NONE
13	ALL	Passed	D_013_NONE
14	ALL	Passed	D_014_NONE
15	OFFLINE		
16	ALL	Passed	D_016_NONE
17	OFFLINE		
18	ALL	Passed	D_018_NONE
19	ALL	Passed	D_019_NONE
20	OFFLINE		
21	OFFLINE		
22	OFFLINE		
23	ALL	Passed	D_023_NONE
24	OFFLINE		
25	ALL	Passed	D_025_NONE
26	OFFLINE		
27	OFFLINE		
28	ALL	Passed	D_028_NONE
29	ALL	Passed	D_029_NONE
30	ALL	Passed	D_030_NONE
31	ALL	Passed	D_031_NONE
32	OFFLINE		
33	ALL	Passed	D_033_NONE
34	ALL	Passed	D_034_NONE
35	OFFLINE		
36	OFFLINE		
37	ALL	Passed	D_037_NONE
38	ALL	Passed	D_038_NONE
39	OFFLINE		
40	OFFLINE		
41	OFFLINE		
42	ALL	Passed	D_042_NONE
43	OFFLINE		
44	OFFLINE		
45	ALL	Passed	D_045_NONE
46	ALL	Passed	D_046_NONE
47	OFFLINE		
48	ALL	Passed	D_048_NONE

APPROVAL DATE: 7.10.07 APPROVAL TIME: _____

APPROVED BY: _____ PROCEDURE # _____

SECTION X

ANALYTICAL DATA (RADIUM-228)

07-07017
Ra228
Run 1

Work Order	07-07017
Analysis Code	Ra228
Run	1
Date Received	7/5/2007
Lab Deadline	7/26/2007
Client	Environmental Chemical Corporation
Project	Li Tungsten
Report Level	4
Activity Units	pCi
Aliquot Units	g
Matrix	SO
Method	EPA 904.0 Modified
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	1481.242
Carrier	Yttirum
Carrier Conc (mg/ml)	31.81

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/05/07 00:00	1.0000E+00
02	MBL	BLANK		07/05/07 00:00	1.0000E+00
03	DUP	5601-FSS-SU3-1014	49	05/25/07 09:45	1.1637E+00
04	DO	5601-FSS-SU3-1014	49	05/25/07 09:45	1.2095E+00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

07-07017
Ra228
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.7056	1045.2	428.3	90.97	2.000	0.0923	0.1590	0.0667	104.84	90.97	1.00	1.00
02	MBL	0.6986	1034.8	435.3	93.39	2.000	0.0924	0.1557	0.0633	99.50	92.92	1.00	1.00
03	DUP	0.7008	1038.1	395.3	84.54	2.000	0.0918	0.1544	0.0626	98.40	83.18	1.00	1.00
04	DO	0.6992	1035.7	410.0	87.88	2.000	0.0921	0.1561	0.0640	100.60	87.88	1.00	1.00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

07-07017
Ra228
Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/06/07 06:47	JBARNARD	07/10/07 12:30	DJOHNSON	07/13/07 07:50	DJOHNSON
02	MBL			07/06/07 06:47	JBARNARD	07/10/07 12:30	DJOHNSON	07/13/07 07:50	DJOHNSON
03	DUP			07/06/07 06:47	JBARNARD	07/10/07 12:30	DJOHNSON	07/13/07 07:50	DJOHNSON
04	DO	07/06/07 08:29	JPACHELLA	07/06/07 06:47	JBARNARD	07/10/07 12:30	DJOHNSON	07/13/07 07:50	DJOHNSON

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ** Actual mass exceeded the calibration curve range. Results should be qualified as appropriate.

Preliminary Data Report & Analytical Calculations
Work Order: 07-07017-Ra228-1

Client	Environmental Chemical Corporation
Eberline Services Work Order	07-07017
Analysis Code	Ra228
Run	1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-228	LCS	LCS	pCi/g	3.30E+01	1.13E+00	1.03E+00	3.79E+01	87.14	OK		OK	
02	RA-228	MBL	BLANK	pCi/g	3.44E-01	4.42E-01	1.04E+00					OK	OK
03	RA-228	DUP	5601-FSS-SU3-1014	pCi/g	3.23E-01	3.89E-01	9.17E-01				INV	OK	
04	RA-228	DO	5601-FSS-SU3-1014	pCi/g	6.29E-01	3.28E-01	7.35E-01					OK	

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-Ra228-1

Client	Environmental Chemical Corporation
Eberline Services Work Order	07-07017
Analysis Code	Ra228
Run	1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	07/05/07 00:00	1.00E+00	90.97	104.84	90.97	1.00	7/10/2007 12:30	7/13/2007 7:50
02	RA-228	MBL	07/05/07 00:00	1.00E+00	93.39	99.50	92.92	1.00	7/10/2007 12:30	7/13/2007 7:50
03	RA-228	DUP	05/25/07 09:45	1.16E+00	84.54	98.40	83.18	1.00	7/10/2007 12:30	7/13/2007 7:50
04	RA-228	DO	05/25/07 09:45	1.21E+00	87.88	100.60	87.88	1.00	7/10/2007 12:30	7/13/2007 7:50

Preliminary Data Report & Analytical Calculations

Work Order: 07-07017-Ra228-1

Client	Environmental Chemical Corporation
Eberline Services Work Order	07-07017
Analysis Code	Ra228
Run	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	07/13/07 09:45		LB4110R	B1	180	4139	1.733333333	0.469663783
02	RA-228	MBL	07/13/07 09:45		LB4110R	B2	180	364	1.8	0.46172497
03	RA-228	DUP	07/13/07 09:45		LB4110R	B3	180	338	1.65	0.483813381
04	RA-228	DO	07/13/07 09:45		LB4110R	B4	180	312	1.25	0.480063304

Count Room Report
Client: Environmental Chemical Co

07-07017-Ra228-1 (pCi/g) in SO
Tracer ID: Ba-6a

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/05/07 00:00	1.0000	0.7056	1045.1644	428.3000	90.97	1.00	1.00
02	MBL	BLANK	07/05/07 00:00	1.0000	0.6986	1034.7957	435.3000	93.39	1.00	1.00
03	DUP	5601-FSS-SU3-1014	05/25/07 09:45	1.1637	0.7008	1038.0544	395.3000	84.54	1.00	1.00
04	DO	5601-FSS-SU3-1014	05/25/07 09:45	1.2095	0.6992	1035.6844	410.0000	87.88	1.00	1.00

Eberline Services
Oak Ridge Laboratory

Spike and Tracer Worksheet

Printed: 7/6/2007 6:47 AM

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
07-07017	1	Ra228	7/6/2007 6:46	JBARNARD	JB	

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Ra-228	Ra-10	103.319	7/6/2007	0.400	0.4082	X2			19.00	0.855	0.00	0.000	0.00	0.000	0.00	0.000
						LCS Dupl			38 *							
						Spike			M							

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Ba-133	Ba-6a	1481.242	7/6/2007	0.7056	0.6800
02	Ba-133	Ba-6a	1481.242	7/6/2007	0.6986	0.6800
03	Ba-133	Ba-6a	1481.242	7/6/2007	0.7008	0.6800
04	Ba-133	Ba-6a	1481.242	7/6/2007	0.6992	0.6800

Balance Printer Tapes

Tracer

LCS

* LCS Dupl Spike

M

Matrix Spike

Eberline Services - Oak Ridge
Version 2.0 8/1999

Aliquot Worksheet

Printed: 7/6/2007 9:03 AM

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
07-07017	1	Ra228	grams	7/26/2007	JBARNARD

Lab Fraction	Environmental Chemical Corporation Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	5601-FSS-SU3-1014	DUP					1.1637E+00	1.1637E+00				
04	5601-FSS-SU3-1014	DO					1.2095E+00	1.2095E+00				

Comments	

Technician: JBarnard Date: 7/6/07

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
07-07017	1	Ra228	Yttirum	31.8100	DJOHNSON

TRetec	Environmental Chemical Corporation	Sample	Carrier Data	Filter Data			Gravimetric
Fraction	Client ID	Type	Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS	2.0000	0.0923	0.1590	0.0667	104.84
02	BLANK	MBL	2.0000	0.0924	0.1557	0.0633	99.50
03	DUP	DUP	2.0000	0.0918	0.1544	0.0626	98.40
04	5601-FSS-SU3-1014	DO	2.0000	0.0921	0.1561	0.0640	100.60

Technician: DJ Date: 7/13/07

Eberline Services - Oak Ridge
Prep Logbook
Version 2.0 8/1999

Rough Sample Preparation Log Book

Printed: 7/6/2007 8:29 AM

Work Order	Lab Deadline	Date Received in Prep	Date Sealed	Date Returned	Technician
07-07017	7/26/2007	7/5/2007	7/6/2007	7/7/2007	JPACHELLA

Eberline Fraction	Environmental Chemical Corporation Client ID	Tare (g) Pan Wt	Gross (g) Wet Wt.	Gross (g) Dry Wt.	Net (g) Wet Wt.	Net (g) Dry Wt.	Percent Liquid	Percent Solid	Gamma Dry Wt.	Gamma LEPS Wt.	Special Info
04	5601-FSS-SU3-1014	28.4000	1894.6500	1555.1600	1866.2500	1526.7600	18.19%	81.81%			

Comments	
Special Codes	H: Hot, O: Organic Hazard, P: PCB Hazard, R: Rush, T: Other (see comments)

Technician: J Pachella

Date: 7-6-07

AG
7/13/07
(R)

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
B1	0707017-01	364	4139	180	1400	7/13/07 12:45
B2	0707017-02	30	364	180	1400	7/13/07 12:45
B3	0707017-03	33	338	180	1400	7/13/07 12:45
B4	0707017-04	33	312	180	1400	7/13/07 12:45

GPC Detector Report
(ALL Backgrounds)

M 7-13-07

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	7/10/2006	7/13/2007	1.00E-01	P	-1.19E-01	1.30E-01	3.80E-01
LB4110A - A2	Alpha	7/10/2006	7/13/2007	1.00E-01	P	-4.95E-02	1.02E-01	2.54E-01
LB4110A - A3	Alpha	7/10/2006	7/13/2007	1.00E-01	P	-2.55E-01	1.15E-01	4.85E-01
LB4110A - A4	Alpha	7/10/2006	7/13/2007	1.00E-01	P	-9.03E-02	1.60E-01	4.10E-01
LB4110A - B1	Alpha	7/10/2006	7/13/2007	8.33E-02	P	-4.94E-02	9.44E-02	2.38E-01
LB4110A - B2	Alpha	7/10/2006	7/13/2007	1.17E-01	P	-4.77E-02	2.41E-01	5.30E-01
LB4110A - B3	Alpha	7/10/2006	7/13/2007	2.67E-01	F	-5.14E-02	1.01E-01	2.54E-01
LB4110A - B4	Alpha	7/10/2006	7/13/2007	1.83E-01	P	-1.74E-01	8.65E-02	3.47E-01
LB4110A - C1	Alpha	7/10/2006	7/13/2007	2.83E-01	F	-5.10E-02	8.84E-02	2.28E-01
LB4110A - C2	Alpha	7/10/2006	7/13/2007	1.83E-01	P	-8.46E-02	1.01E-01	2.87E-01
LB4110A - C3	Alpha	7/10/2006	7/13/2007	3.33E-02	P	-1.35E-01	1.19E-01	3.73E-01
LB4110A - C4	Alpha	7/10/2006	7/13/2007	1.00E-01	P	-5.47E-02	9.13E-02	2.37E-01
LB4110A - D1	Alpha	7/10/2006	7/13/2007	6.67E-02	P	-1.02E-01	1.53E-01	4.09E-01
LB4110A - D2	Alpha	7/10/2006	7/13/2007	0.00E+00	P	-2.43E-01	2.26E-01	6.96E-01
LB4110A - D3	Alpha	7/10/2006	7/13/2007	1.67E-01	P	-1.34E-01	1.62E-01	4.58E-01
LB4110A - D4	Alpha	7/10/2006	7/13/2007	1.00E-01	P	-4.47E-02	1.34E-01	3.14E-01
LB4110R - A1	Alpha	7/10/2006	7/13/2007	6.67E-02	P	-5.13E-02	1.22E-01	2.95E-01
LB4110R - A2	Alpha	7/10/2006	7/13/2007	2.00E-01	P	-5.39E-02	1.75E-01	4.04E-01
LB4110R - A3	Alpha	7/10/2006	7/13/2007	1.83E-01	P	-3.41E-02	1.28E-01	2.91E-01
LB4110R - A4	Alpha	7/10/2006	7/13/2007	8.33E-02	P	-2.84E-02	1.13E-01	2.54E-01
LB4110R - B1	Alpha	7/10/2006	7/13/2007	6.67E-02	P	-2.26E-02	1.15E-01	2.53E-01
LB4110R - B2	Alpha	7/10/2006	7/13/2007	3.33E-02	P	-1.82E-02	1.30E-01	2.79E-01
LB4110R - B3	Alpha	7/10/2006	7/13/2007	1.67E-01	P	-3.75E-02	1.14E-01	2.66E-01
LB4110R - B4	Alpha	7/10/2006	7/13/2007	1.67E-01	P	-3.10E-02	1.24E-01	2.79E-01
LB4110R - C1	Alpha	7/10/2006	7/13/2007	1.83E-01	P	-2.01E-02	1.47E-01	3.14E-01
LB4110R - C2	Alpha	7/10/2006	7/13/2007	1.00E-01	P	-3.41E-02	1.42E-01	3.19E-01
LB4110R - C3	Alpha	7/10/2006	7/13/2007	2.17E-01	P	-6.92E-03	1.82E-01	3.72E-01
LB4110R - C4	Alpha	7/10/2006	7/13/2007	1.17E-01	P	-3.71E-02	1.33E-01	3.03E-01
LB4110R - D1	Alpha	7/10/2006	7/13/2007	6.67E-02	P	-4.67E-02	1.46E-01	3.38E-01
LB4110R - D2	Alpha	7/10/2006	7/13/2007	8.33E-02	P	-1.19E-02	1.38E-01	2.87E-01
LB4110R - D3	Alpha	7/10/2006	7/13/2007	1.83E-01	P	-4.52E-02	1.04E-01	2.54E-01
LB4110R - D4	Alpha	7/10/2006	7/13/2007	6.67E-02	P	-1.32E-02	1.33E-01	2.79E-01
LB5100 - 1	Alpha	7/10/2006	7/13/2007	7.00E-02	P	-1.27E-02	9.52E-02	2.03E-01

GPC Detector Report
(ALL Backgrounds)

Mu 7-13-07

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	7/10/2006	7/13/2007	1.43E+00	P	-8.54E-01	1.27E+00	3.40E+00
LB4110A - A2	Beta	7/10/2006	7/13/2007	3.62E+00	P	-1.50E+00	2.80E+00	7.11E+00
LB4110A - A3	Beta	7/10/2006	7/13/2007	1.38E+00	P	1.48E-01	1.21E+00	2.28E+00
LB4110A - A4	Beta	7/10/2006	7/13/2007	3.25E+00	P	-4.18E-01	2.47E+00	5.35E+00
LB4110A - B1	Beta	7/10/2006	7/13/2007	1.18E+00	P	5.78E-01	1.46E+00	2.35E+00
LB4110A - B2	Beta	7/10/2006	7/13/2007	1.12E+00	P	7.54E-01	1.24E+00	1.73E+00
LB4110A - B3	Beta	7/10/2006	7/13/2007	1.75E+00	P	1.04E+00	1.60E+00	2.16E+00
LB4110A - B4	Beta	7/10/2006	7/13/2007	1.28E+00	P	-1.96E-01	1.44E+00	3.07E+00
LB4110A - C1	Beta	7/10/2006	7/13/2007	2.00E+00	F	8.25E-01	1.39E+00	1.95E+00
LB4110A - C2	Beta	7/10/2006	7/13/2007	1.70E+00	P	2.50E-01	1.64E+00	3.03E+00
LB4110A - C3	Beta	7/10/2006	7/13/2007	1.48E+00	P	8.73E-01	1.47E+00	2.07E+00
LB4110A - C4	Beta	7/10/2006	7/13/2007	1.52E+00	P	8.78E-01	1.44E+00	2.00E+00
LB4110A - D1	Beta	7/10/2006	7/13/2007	8.50E-01	F	8.80E-01	1.37E+00	1.86E+00
LB4110A - D2	Beta	7/10/2006	7/13/2007	3.15E+05	F	-4.93E+04	1.22E+03	5.17E+04
LB4110A - D3	Beta	7/10/2006	7/13/2007	1.35E+00	P	3.43E-01	1.38E+00	2.41E+00
LB4110A - D4	Beta	7/10/2006	7/13/2007	3.68E+00	W	-8.27E-01	1.66E+00	4.14E+00
LB4110R - A1	Beta	7/10/2006	7/13/2007	1.10E+00	P	8.61E-01	1.41E+00	1.96E+00
LB4110R - A2	Beta	7/10/2006	7/13/2007	1.45E+00	P	6.70E-01	1.58E+00	2.49E+00
LB4110R - A3	Beta	7/10/2006	7/13/2007	6.75E+00	P	-1.01E+01	5.68E+00	2.15E+01
LB4110R - A4	Beta	7/10/2006	7/13/2007	1.33E+00	P	-2.05E-01	1.53E+00	3.27E+00
LB4110R - B1	Beta	7/10/2006	7/13/2007	1.73E+00	P	9.28E-01	2.04E+00	3.15E+00
LB4110R - B2	Beta	7/10/2006	7/13/2007	1.80E+00	P	9.90E-01	1.75E+00	2.51E+00
LB4110R - B3	Beta	7/10/2006	7/13/2007	1.65E+00	P	3.55E-01	1.37E+00	2.38E+00
LB4110R - B4	Beta	7/10/2006	7/13/2007	1.25E+00	P	4.91E-01	1.31E+00	2.14E+00
LB4110R - C1	Beta	7/10/2006	7/13/2007	1.47E+00	P	9.58E-01	1.59E+00	2.23E+00
LB4110R - C2	Beta	7/10/2006	7/13/2007	1.15E+00	P	8.31E-01	1.41E+00	1.98E+00
LB4110R - C3	Beta	7/10/2006	7/13/2007	1.43E+00	P	-6.08E-01	1.52E+00	3.65E+00
LB4110R - C4	Beta	7/10/2006	7/13/2007	1.35E+00	P	5.10E-02	1.33E+00	2.60E+00
LB4110R - D1	Beta	7/10/2006	7/13/2007	1.28E+00	P	1.02E+00	1.53E+00	2.04E+00
LB4110R - D2	Beta	7/10/2006	7/13/2007	1.40E+00	P	8.76E-01	1.33E+00	1.79E+00
LB4110R - D3	Beta	7/10/2006	7/13/2007	1.45E+00	P	7.73E-01	1.43E+00	2.08E+00
LB4110R - D4	Beta	7/10/2006	7/13/2007	1.48E+00	P	7.58E-01	1.26E+00	1.77E+00
LB5100 - 1	Beta	7/10/2006	7/13/2007	1.53E+00	P	1.01E+00	1.40E+00	1.79E+00

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	7/10/2006	7/13/2007	0.2489	P	0.2109	0.2533	0.2958
LB4110A - A2	Alpha	7/10/2006	7/13/2007	0.2271	P	0.1904	0.2307	0.2710
LB4110A - A3	Alpha	7/10/2006	7/13/2007	0.2256	P	0.1910	0.2297	0.2683
LB4110A - A4	Alpha	7/10/2006	7/13/2007	0.2449	P	0.2011	0.2417	0.2824
LB4110A - B1	Alpha	7/10/2006	7/13/2007	0.2419	P	0.2044	0.2452	0.2860
LB4110A - B2	Alpha	7/10/2006	7/13/2007	0.2392	P	0.2000	0.2417	0.2834
LB4110A - B3	Alpha	7/10/2006	7/13/2007	0.2533	P	0.2103	0.2521	0.2939
LB4110A - B4	Alpha	7/10/2006	7/13/2007	0.2519	P	0.2114	0.2537	0.2961
LB4110A - C1	Alpha	7/10/2006	7/13/2007	0.2268	P	0.1885	0.2331	0.2777
LB4110A - C2	Alpha	7/10/2006	7/13/2007	0.2315	P	0.1925	0.2356	0.2787
LB4110A - C3	Alpha	7/10/2006	7/13/2007	0.2410	P	0.1870	0.2446	0.3022
LB4110A - C4	Alpha	7/10/2006	7/13/2007	0.2431	P	0.2022	0.2463	0.2905
LB4110A - D1	Alpha	7/10/2006	7/13/2007	0.1663	F	0.2027	0.2478	0.2928
LB4110A - D2	Alpha	7/10/2006	7/13/2007	0.0000	F	0.2045	0.2678	0.3310
LB4110A - D3	Alpha	7/10/2006	7/13/2007	0.2682	P	0.2222	0.2687	0.3151
LB4110A - D4	Alpha	7/10/2006	7/13/2007	0.2125	P	0.1819	0.2288	0.2757
LB4110R - A1	Alpha	7/10/2006	7/13/2007	0.2487	P	0.2208	0.2477	0.2745
LB4110R - A2	Alpha	7/10/2006	7/13/2007	0.2180	P	0.2066	0.2322	0.2578
LB4110R - A3	Alpha	7/10/2006	7/13/2007	0.2348	P	0.2221	0.2369	0.2516
LB4110R - A4	Alpha	7/10/2006	7/13/2007	0.2411	P	0.2261	0.2479	0.2697
LB4110R - B1	Alpha	7/10/2006	7/13/2007	0.2299	P	0.2179	0.2362	0.2544
LB4110R - B2	Alpha	7/10/2006	7/13/2007	0.2181	P	0.2112	0.2270	0.2429
LB4110R - B3	Alpha	7/10/2006	7/13/2007	0.2546	P	0.2472	0.2555	0.2639
LB4110R - B4	Alpha	7/10/2006	7/13/2007	0.2368	W	0.2356	0.2471	0.2587
LB4110R - C1	Alpha	7/10/2006	7/13/2007	0.2158	P	0.1657	0.2196	0.2735
LB4110R - C2	Alpha	7/10/2006	7/13/2007	0.2154	P	0.1710	0.2269	0.2829
LB4110R - C3	Alpha	7/10/2006	7/13/2007	0.2435	P	0.2026	0.2431	0.2835
LB4110R - C4	Alpha	7/10/2006	7/13/2007	0.2333	P	0.2138	0.2390	0.2642
LB4110R - D1	Alpha	7/10/2006	7/13/2007	0.2291	P	0.2166	0.2331	0.2497
LB4110R - D2	Alpha	7/10/2006	7/13/2007	0.2580	P	0.2504	0.2582	0.2661
LB4110R - D3	Alpha	7/10/2006	7/13/2007	0.2583	P	0.2506	0.2589	0.2673
LB4110R - D4	Alpha	7/10/2006	7/13/2007	0.2150	P	0.2034	0.2264	0.2493
LB5100 - 1	Alpha	7/10/2006	7/13/2007	0.3458	P	0.3323	0.3456	0.3588

GPC Detector Report
(ALL Efficiencies)

7.13.07

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	7/10/2006	7/13/2007	0.5724	P	0.4810	0.5791	0.6772
LB4110A - A2	Beta	7/10/2006	7/13/2007	0.4972	P	0.4247	0.5264	0.6281
LB4110A - A3	Beta	7/10/2006	7/13/2007	0.5406	P	0.4602	0.5529	0.6456
LB4110A - A4	Beta	7/10/2006	7/13/2007	0.5773	P	0.4743	0.5688	0.6633
LB4110A - B1	Beta	7/10/2006	7/13/2007	0.5772	P	0.4858	0.5824	0.6790
LB4110A - B2	Beta	7/10/2006	7/13/2007	0.5706	P	0.4779	0.5782	0.6785
LB4110A - B3	Beta	7/10/2006	7/13/2007	0.6114	P	0.5066	0.6054	0.7041
LB4110A - B4	Beta	7/10/2006	7/13/2007	0.5979	P	0.4933	0.5979	0.7026
LB4110A - C1	Beta	7/10/2006	7/13/2007	0.5280	P	0.4341	0.5381	0.6422
LB4110A - C2	Beta	7/10/2006	7/13/2007	0.5321	P	0.4523	0.5536	0.6550
LB4110A - C3	Beta	7/10/2006	7/13/2007	0.5638	P	0.4368	0.5718	0.7068
LB4110A - C4	Beta	7/10/2006	7/13/2007	0.5626	P	0.4741	0.5766	0.6791
LB4110A - D1	Beta	7/10/2006	7/13/2007	0.4736	F	0.4794	0.5823	0.6852
LB4110A - D2	Beta	7/10/2006	7/13/2007	3.6325	F	0.1238	0.6211	1.1184
LB4110A - D3	Beta	7/10/2006	7/13/2007	0.6112	P	0.5091	0.6125	0.7159
LB4110A - D4	Beta	7/10/2006	7/13/2007	0.4903	P	0.4191	0.5319	0.6448
LB4110R - A1	Beta	7/10/2006	7/13/2007	0.5808	P	0.5446	0.5885	0.6324
LB4110R - A2	Beta	7/10/2006	7/13/2007	0.5365	P	0.4877	0.5531	0.6184
LB4110R - A3	Beta	7/10/2006	7/13/2007	0.5564	P	0.5333	0.5690	0.6048
LB4110R - A4	Beta	7/10/2006	7/13/2007	0.5960	P	0.5660	0.5938	0.6216
LB4110R - B1	Beta	7/10/2006	7/13/2007	0.5560	P	0.5471	0.5744	0.6016
LB4110R - B2	Beta	7/10/2006	7/13/2007	0.5264	P	0.5172	0.5453	0.5734
LB4110R - B3	Beta	7/10/2006	7/13/2007	0.6020	P	0.5960	0.6110	0.6259
LB4110R - B4	Beta	7/10/2006	7/13/2007	0.5693	P	0.5388	0.5837	0.6287
LB4110R - C1	Beta	7/10/2006	7/13/2007	0.4906	P	0.4126	0.5152	0.6178
LB4110R - C2	Beta	7/10/2006	7/13/2007	0.5170	P	0.4295	0.5348	0.6401
LB4110R - C3	Beta	7/10/2006	7/13/2007	0.5654	P	0.4734	0.5676	0.6618
LB4110R - C4	Beta	7/10/2006	7/13/2007	0.5505	P	0.5174	0.5610	0.6045
LB4110R - D1	Beta	7/10/2006	7/13/2007	0.5418	P	0.4889	0.5474	0.6060
LB4110R - D2	Beta	7/10/2006	7/13/2007	0.6017	P	0.5848	0.5996	0.6144
LB4110R - D3	Beta	7/10/2006	7/13/2007	0.5897	P	0.5756	0.5888	0.6019
LB4110R - D4	Beta	7/10/2006	7/13/2007	0.5085	P	0.4750	0.5333	0.5916
LB5100 - 1	Beta	7/10/2006	7/13/2007	0.4697	P	0.4615	0.4748	0.4880

SECTION XI

BARIUM-133 ANALYTICAL TRACER DATA

VAX/VMS Peak Search Report Generated 10-JUL-2007 14:02:59.11 JP 7/10/07

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_070701701_GE3_BAFIL_111960.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : SPIKE
Deposition Date :
Sample Date : 10-JUL-2007 00:00:00 Acquisition date : 10-JUL-2007 13:47:43
Sample ID : 0707017-01 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.32 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	62.38	335	60	1.75	63.08	59	17	3.72E-01	6.5	5.87E+00
2	3	66.31	144	56	1.76	67.01	59	17	1.60E-01	13.2	
3	3	71.43	27	53	1.77	72.13	59	17	2.95E-02	48.0	
4	2	77.59	23	35	1.62	78.28	77	15	2.57E-02	39.0	4.28E+00
5	2	81.53	933	53	1.46	82.22	77	15	1.04E+00	3.4	
6	0	94.12	75	88	2.85	94.81	91	10	8.34E-02	26.0	
7	3	112.38	272	73	1.86	113.06	108	13	3.02E-01	7.9	1.37E+00
8	3	116.86	64	60	1.87	117.54	108	13	7.11E-02	24.6	
9	0	198.18	18	54	1.92	198.82	196	6	2.00E-02	68.3	
10	0	239.59	30	51	1.23	240.21	236	8	3.31E-02	46.2	
11	0	277.35	52	36	1.37	277.95	275	7	5.74E-02	23.6	
12	2	303.59	159	23	1.56	304.18	301	20	1.77E-01	8.9	2.87E+00
13	2	308.15	27	25	1.93	308.74	301	20	3.05E-02	36.3	
14	1	334.52	94	20	1.78	335.10	331	12	1.04E-01	12.2	3.19E+00
15	1	338.59	20	16	1.78	339.16	331	12	2.24E-02	44.8	
16	5	356.82	569	8	1.49	357.39	353	20	6.32E-01	4.2	1.43E+00
17	5	365.67	19	5	2.64	366.24	353	20	2.14E-02	41.5	
18	0	377.56	20	8	1.35	378.11	374	8	2.27E-02	32.5	
19	5	384.46	156	3	1.94	385.02	382	16	1.74E-01	8.2	1.12E+01
20	5	387.81	229	1	1.82	388.36	382	16	2.55E-01	7.1	
21	5	392.11	56	0	2.14	392.66	382	16	6.19E-02	21.9	
22	3	415.56	56	11	2.23	416.10	413	14	6.20E-02	17.5	1.60E+01
23	3	418.97	36	7	2.24	419.51	413	14	4.04E-02	28.2	
24	3	422.89	15	4	2.24	423.43	413	14	1.67E-02	47.6	
25	0	438.13	99	11	1.96	438.66	434	8	1.10E-01	11.5	
26	0	462.77	7	0	1.16	463.29	460	6	7.78E-03	37.8	
27	3	468.66	27	0	2.28	469.18	466	14	3.04E-02	20.4	1.45E+00
28	3	471.84	6	0	2.08	472.36	466	14	6.25E-03	100.5	
29	0	511.43	21	4	3.07	511.93	509	8	2.33E-02	27.4	

Sample ID : 0707017-01
Acquisition date : 10-JUL-2007 13:47:43

Total number of lines in spectrum	29	-
Number of unidentified lines	25	
Number of lines tentatively identified by NID	4	13.79%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.282E+02	4.283E+02	0.794E+02	18.53	
			---------	---------			
	Total Activity :		4.282E+02	4.283E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	6.963E+02	6.963E+02	1.013E+02	14.54	
			---------	---------			
	Total Activity :		6.963E+02	6.963E+02			
	Grand Total Activity :		1.125E+03	1.125E+03			

Flags: "K" = Keyline not found
"M" = Manually accepted
"E" = Manually edited
"A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.982E+01	4.282E+02	4.283E+02	18.53	OK
	302.84	17.80	5.790E+00	4.634E+02	4.634E+02	33.88	OK
	356.01	60.00	6.459E+00	4.408E+02	4.408E+02	17.72	OK

Final Mean for 3 Valid Peaks = 4.283E+02+/- 7.937E+01 (18.53%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	3.797E+01	6.963E+02	6.963E+02	14.54	OK

Final Mean for 1 Valid Peaks = 6.963E+02+/- 1.013E+02 (14.54%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.283E+02	7.937E+01	1.920E+01	3.213E+00	22.305
TH-234	6.963E+02	1.013E+02	7.932E+01	4.187E+00	8.778

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.439E+00		8.140E+00	1.353E+01	2.880E+00	0.106
CD-109	-1.396E+02		1.364E+02	1.635E+02	1.984E+01	-0.854
PA-231	0.000E+00		0.000E+00	1.933E-01	3.873E-03	0.000
PA-234	0.000E+00		0.000E+00	1.251E-01	2.507E-03	0.000
NP-237	-2.447E+01		3.953E+01	5.143E+01	6.014E+00	-0.476
AM-241	7.790E+00		5.058E+00	9.266E+00	4.080E-01	0.841

7/10/07

VAX/VMS Peak Search Report Generated 10-JUL-2007 14:18:39.60

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_070701702_GE3_BAFIL_111963.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : BLANK
Deposition Date :
Sample Date : 10-JUL-2007 00:00:00 Acquisition date : 10-JUL-2007 14:03:17
Sample ID : 0707017-02 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.22 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	62.26	250	74	1.45	62.96	59	12	2.78E-01	8.0	2.40E+00
2	1	66.36	131	79	1.46	67.06	59	12	1.46E-01	12.9	
3	0	81.51	948	119	1.34	82.20	78	8	1.05E+00	3.8	
4	0	102.49	31	60	1.77	103.18	100	6	3.44E-02	43.7	
5	3	112.34	271	58	1.71	113.02	109	22	3.01E-01	7.3	1.33E+00
6	3	116.62	68	66	1.86	117.29	109	22	7.52E-02	25.6	
7	0	131.59	16	41	2.14	132.26	130	5	1.73E-02	66.5	
8	0	277.78	60	54	1.44	278.38	274	9	6.68E-02	25.8	
9	1	303.51	168	13	1.63	304.10	298	14	1.87E-01	8.3	9.84E-01
10	1	308.33	52	9	1.76	308.92	298	14	5.78E-02	17.0	
11	3	334.39	83	22	1.78	334.97	330	22	9.20E-02	13.6	7.80E-01
12	3	338.70	22	18	2.16	339.28	330	22	2.44E-02	44.8	
13	3	346.67	8	14	2.17	347.24	330	22	8.87E-03	94.4	
14	0	356.86	607	19	1.90	357.43	352	11	6.74E-01	4.3	
15	1	384.45	171	12	1.82	385.00	382	16	1.90E-01	7.6	3.98E+01
16	1	387.61	247	10	1.82	388.17	382	16	2.74E-01	8.1	
17	1	391.61	46	8	1.83	392.17	382	16	5.12E-02	27.3	
18	1	415.63	37	24	1.85	416.17	412	11	4.11E-02	26.1	3.97E+00
19	1	419.29	16	24	1.85	419.83	412	11	1.76E-02	57.0	
20	0	437.92	112	7	1.88	438.45	434	9	1.25E-01	10.3	
21	3	465.16	5	0	2.28	465.68	464	8	5.87E-03	42.3	2.52E-01
22	3	468.78	20	0	1.87	469.30	464	8	2.25E-02	24.7	
23	0	473.38	10	0	1.99	473.90	472	5	1.11E-02	31.6	
24	0	485.43	11	4	1.53	485.94	483	8	1.17E-02	45.5	
25	0	511.48	22	2	4.10	511.98	507	9	2.41E-02	24.9	
26	1	607.72	5	1	1.98	608.18	607	9	5.47E-03	36.6	5.64E-01
27	1	610.73	9	1	1.98	611.18	607	9	1.02E-02	42.5	
28	0	840.65	8	0	1.20	841.00	838	6	8.89E-03	35.4	

Sample ID : 0707017-02 Acquisition date : 10-JUL-2007 14:03:17

Total number of lines in spectrum	28	
Number of unidentified lines	23	
Number of lines tentatively identified by NID	5	17.86%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.353E+02	4.353E+02	0.819E+02	18.82	
	Total Activity :		4.353E+02	4.353E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	5.199E+02	5.199E+02	0.898E+02	17.28	
	Total Activity :		5.199E+02	5.199E+02			
	Grand Total Activity :		9.551E+02	9.552E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.982E+01	4.353E+02	4.353E+02	18.82	OK
	302.84	17.80	5.790E+00	4.899E+02	4.900E+02	33.29	OK
	356.01	60.00	6.459E+00	4.702E+02	4.702E+02	17.81	OK

Final Mean for 3 Valid Peaks = 4.353E+02+/- 8.192E+01 (18.82%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	3.797E+01	5.199E+02	5.199E+02	17.28	OK

Final Mean for 1 Valid Peaks = 5.199E+02+/- 8.981E+01 (17.28%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.353E+02	8.192E+01	1.627E+01	2.722E+00	26.762
TH-234	5.199E+02	8.981E+01	9.741E+01	5.142E+00	5.337

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.347E+00		8.748E+00	1.273E+01	2.710E+00	-0.499
CD-109	5.583E+01		1.153E+02	1.971E+02	2.391E+01	0.283
PA-231	0.000E+00		0.000E+00	1.933E-01	3.873E-03	0.000
PA-234	0.000E+00		0.000E+00	1.251E-01	2.507E-03	0.000
NP-237	1.906E+01		3.259E+01	5.627E+01	6.579E+00	0.339
AM-241	6.640E+00		5.287E+00	9.440E+00	4.157E-01	0.703

7/10/07

VAX/VMS Peak Search Report Generated 10-JUL-2007 14:34:38.41

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_070701703_GE3_BAFIL_111964.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : 5601-FSS-SU3-1014
Deposition Date :
Sample Date : 10-JUL-2007 00:00:00 Acquisition date : 10-JUL-2007 14:19:20
Sample ID : 0707017-03 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.16 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	62.31	282	55	1.45	63.01	59	11	3.13E-01	7.3	9.50E+00
2	1	66.17	102	56	1.46	66.87	59	11	1.13E-01	15.6	
3	1	81.44	861	51	1.48	82.13	78	11	9.57E-01	3.6	6.18E+00
4	1	84.18	32	39	1.49	84.86	78	11	3.53E-02	59.7	
5	1	112.21	228	48	1.53	112.88	109	16	2.53E-01	8.2	3.54E+00
6	1	116.46	39	46	1.54	117.14	109	16	4.30E-02	33.0	
7	2	237.70	13	30	1.86	238.32	235	16	1.42E-02	75.7	7.84E-01
8	2	246.13	13	30	1.87	246.75	235	16	1.42E-02	73.6	
9	0	277.15	50	53	1.30	277.76	274	8	5.53E-02	29.2	
10	0	303.79	162	32	1.55	304.38	299	8	1.80E-01	9.9	
11	3	334.32	79	12	1.89	334.90	330	14	8.77E-02	13.9	3.19E+00
12	3	338.98	27	12	2.16	339.56	330	14	2.96E-02	33.1	
13	0	356.80	545	17	1.91	357.37	352	11	6.06E-01	4.5	
14	1	384.44	129	16	1.82	384.99	382	10	1.43E-01	10.6	6.68E+00
15	1	387.61	213	42	1.81	388.17	382	10	2.37E-01	9.4	
16	0	407.13	12	6	3.24	407.68	403	8	1.33E-02	45.6	
17	3	412.67	8	2	2.03	413.21	411	16	8.65E-03	46.3	2.06E+00
18	3	415.55	49	5	2.23	416.09	411	16	5.42E-02	19.0	
19	3	419.02	25	6	2.24	419.56	411	16	2.80E-02	37.7	
20	3	422.90	14	7	2.24	423.44	411	16	1.54E-02	51.1	
21	1	433.64	6	1	1.86	434.17	433	9	6.93E-03	33.0	4.62E+00
22	1	437.60	95	1	1.64	438.13	433	9	1.06E-01	10.8	
23	0	469.16	22	9	1.96	469.68	466	6	2.45E-02	30.2	
24	0	511.68	16	2	3.97	512.17	508	8	1.78E-02	29.2	
25	0	599.67	8	0	2.83	600.12	597	6	8.89E-03	35.4	

Sample ID : 0707017-03 Acquisition date : 10-JUL-2007 14:19:20

Total number of lines in spectrum 25
Number of unidentified lines 21
Number of lines tentatively identified by NID 4 16.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.952E+02	3.953E+02	0.738E+02	18.68	
	Total Activity :		3.952E+02	3.953E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	5.869E+02	5.869E+02	0.946E+02	16.11	
	Total Activity :		5.869E+02	5.869E+02			
	Grand Total Activity :		9.821E+02	9.822E+02			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.982E+01	3.952E+02	3.953E+02	18.68	OK
	302.84	17.80	5.790E+00	4.720E+02	4.720E+02	35.00	OK
	356.01	60.00	6.459E+00	4.226E+02	4.226E+02	18.03	OK

Final Mean for 3 Valid Peaks = 3.953E+02+/- 7.384E+01 (18.68%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	3.797E+01	5.869E+02	5.869E+02	16.11	OK

Final Mean for 1 Valid Peaks = 5.869E+02+/- 9.458E+01 (16.11%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.953E+02	7.384E+01	1.730E+01	2.896E+00	22.843
TH-234	5.869E+02	9.458E+01	8.895E+01	4.696E+00	6.598

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.409E+00		7.319E+00	1.169E+01	2.489E+00	-0.121
CD-109	-3.259E+01		9.499E+01	1.498E+02	1.818E+01	-0.218
PA-231	0.000E+00		0.000E+00	1.933E-01	3.873E-03	0.000
PA-234	0.000E+00		0.000E+00	1.251E-01	2.507E-03	0.000
NP-237	2.600E+01		2.749E+01	5.028E+01	5.878E+00	0.517
AM-241	9.598E+00		5.353E+00	9.873E+00	4.347E-01	0.972

VAX/VMS Peak Search Report Generated 10-JUL-2007 14:50:05.57

7/10/07

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_070701704_GE3_BAFIL_111965.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : 5601-FSS-SU3-1014
Deposition Date :
Sample Date : 10-JUL-2007 00:00:00 Acquisition date : 10-JUL-2007 14:34:46
Sample ID : 0707017-04 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.07 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	62.23	243	61	1.45	62.93	59	12	2.70E-01	8.1	3.74E+00
2	1	66.27	115	65	1.46	66.96	59	12	1.27E-01	14.0	
3	1	81.43	893	56	1.48	82.12	77	12	9.92E-01	3.5	1.11E+01
4	1	84.18	18	47	1.49	84.86	77	12	1.94E-02	104.4	
5	0	93.16	48	79	1.55	93.84	89	9	5.39E-02	36.3	
6	0	101.13	43	87	1.57	101.82	98	9	4.80E-02	41.6	
7	4	112.38	256	47	1.67	113.05	109	13	2.84E-01	7.4	2.01E+00
8	4	116.73	52	46	2.05	117.41	109	13	5.77E-02	31.1	
9	0	161.74	14	65	0.96	162.39	159	6	1.56E-02	94.1	
10	0	277.43	45	19	1.31	278.04	276	5	5.00E-02	20.8	
11	3	303.68	177	10	1.60	304.27	300	15	1.97E-01	8.0	1.61E+00
12	3	307.88	31	16	2.13	308.47	300	15	3.40E-02	38.4	
13	3	311.37	10	18	2.13	311.96	300	15	1.10E-02	83.7	
14	0	334.10	63	48	1.32	334.68	331	7	7.02E-02	19.8	
15	5	356.84	551	18	1.63	357.41	353	21	6.12E-01	4.4	3.49E+00
16	5	365.53	22	28	2.64	366.09	353	21	2.48E-02	45.7	
17	1	384.33	127	11	1.82	384.89	381	15	1.41E-01	9.5	8.95E+00
18	1	387.61	206	9	1.82	388.17	381	15	2.29E-01	8.8	
19	1	392.28	49	6	1.83	392.83	381	15	5.42E-02	17.1	
20	1	415.59	44	12	1.85	416.13	410	17	4.93E-02	20.0	9.22E-01
21	1	419.29	22	8	1.85	419.83	410	17	2.49E-02	35.9	
22	1	422.63	12	7	1.85	423.17	410	17	1.36E-02	58.4	
23	0	438.08	110	11	2.02	438.61	434	9	1.22E-01	11.0	
24	5	463.48	5	1	1.71	464.00	463	13	5.10E-03	5.4	2.94E+00
25	5	468.48	26	2	2.76	469.00	463	13	2.84E-02	25.4	
26	5	471.95	10	1	2.77	472.47	463	13	1.15E-02	63.4	
27	0	512.06	17	8	2.70	512.56	508	10	1.91E-02	38.5	
28	0	603.10	9	0	3.50	603.56	601	6	1.00E-02	33.3	

Total number of lines in spectrum	28	-
Number of unidentified lines	24	
Number of lines tentatively identified by NID	4	14.29%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.100E+02	4.100E+02	0.762E+02	18.58	
			---	---			
	Total Activity :		4.100E+02	4.100E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	5.059E+02	5.059E+02	0.882E+02	17.43	
			---	---			
	Total Activity :		5.059E+02	5.059E+02			

Grand Total Activity : 9.159E+02 9.160E+02

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.982E+01	4.100E+02	4.100E+02	18.58	OK
	302.84	17.80	5.790E+00	5.169E+02	5.170E+02	32.95	OK
	356.01	60.00	6.459E+00	4.269E+02	4.270E+02	17.91	OK

Final Mean for 3 Valid Peaks = 4.100E+02+/- 7.620E+01 (18.58%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	3.797E+01	5.059E+02	5.059E+02	17.43	OK

Final Mean for 1 Valid Peaks = 5.059E+02+/- 8.819E+01 (17.43%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.100E+02	7.620E+01	1.692E+01	2.831E+00	24.238
TH-234	5.059E+02	8.819E+01	9.791E+01	5.169E+00	5.167

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.084E+00		8.149E+00	1.304E+01	2.776E+00	-0.083
CD-109	2.672E+01		1.199E+02	1.790E+02	2.172E+01	0.149
PA-231	0.000E+00		0.000E+00	1.933E-01	3.873E-03	0.000
PA-234	0.000E+00		0.000E+00	1.251E-01	2.507E-03	0.000
NP-237	1.458E+01		3.458E+01	5.297E+01	6.192E+00	0.275
AM-241	6.975E+00		5.155E+00	9.299E+00	4.095E-01	0.750

SECTION XII

ANALYTICAL STANDARD

QA/QC REVIEWED
Date 1/16/95 Initials VK

U-8

CERTIFICATE OF CALIBRATION - ALPHA STANDARD SOLUTION

Radionuclide:	U-238NAT	Customer:	TMA EBERLINE
Half Life:	(4.468 ± 0.005) x 10^9 years	P.O.No.:	OR2778
Catalog No.:	7338	Reference Date:	January 1 1995 12:00 PST.
Source No.:	479-50	Contained Radioactivity:	(Total U) 8.016 μCi
		Contained Radioactivity:	(Total U) 297 kBq

Description of Solution

a. Mass of solution: 65.2896 g in a 50 ml flame sealed ampoule

b. Chemical form: Uranyl Nitrate in H2O

c. Carrier content: None

d. Density: Approximately 1.3202 g/ml @ 20°C.

Radioimpurities: Refer to attached technical data sheet

Radioactive Daughters: Refer to attached technical data sheet

Radionuclide Concentration

(Total U) 0.1228 μCi/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±3.0%
b. Random uncertainty in assay:	±0.0%
c. Random uncertainty in weighing(s):	±2.0%
d. Total uncertainty at the 99% confidence level:	±3.6%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

See reverse side for Leak Test(s) applied to this source.

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

ERIC ALLAS
QUALITY CONTROL

29 DECEMBER 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
3017 N. SAN FERNANDO BLVD.
BURBANK, CALIFORNIA 91504
818·843·7000 FAX 818·843·6168

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 11/01/03

Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 12/13/2006 0:00

SOLUTION REFERENCE #: IPL 479-50 | SOLUTION #: U-8

Principal Radionuclide	Half Life, Years	Half Life, Days
$^{234, 235, 238}U$	4.468E+09	1.632E+12

Radionuclide: $^{234, 235, 238}U$

Reference Date: 1/1/1995 0:00

Certified Activity: 8.016E+00 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross	97.6400	Weight, Grams
Empty Ampoule	32.5020	Weight, Grams
Solution Net	65.1380	Weight, Grams
Total Activity in Ampoule	8.0160	µCi

Chemical Composition of Standard Solution

Uranyl nitrate in dilute HNO_3

Dilution Instructions:

Dilution Solvent Used: 1M HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 8.0160 µCi Which Equals 1.780E+07 dpm at the date listed above

And after dilution the activity of this solution is 1.77955E+04 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 13, 2007

Recertified By _____ Date: 12/13/2006 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/10/07

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP-009	Date	12/13/2006 0:00
Solution Reference #	IPL 479-50	Solution #	U-8a

Principal Radionuclide	Half Life, Years	Half Life, Days
$^{234, 235, 238}U$	4.468E+09	1.632E+12

Radionuclide of Interest: $^{234, 235, 238}U$
Parent Solution Conc.: 1.7796E+04 dpm/ml

Reference Date: 1/1/1995 0:00

Chemical Composition of Standard Solution
Uranly Nitrate in 1M HNO_3

Dilution Instructions:

Dilution Solvent Used: 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 4.0000 ml
Total Activity: 7.1182E+04 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 7.1182E+01 dpm/ml

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Isotopic Distribution as:
U-238 Atom % = 48.239 U-238 = 71.182 dpm/ml X 0.48249 = 34.345 dpm/ml
U-235 Atom % = 2.25 U-235 = 71.182 dpm/ml X 0.0225 = 1.602 dpm/ml
U-234 Atom % = 49.501 U-238 = 71.182 dpm/ml X 0.49501 = 35.236 dpm/ml
All values +/- 3.6%

Isotopic ratios from manufacturer's data sheet

Expiration Date: December 13, 2007

Recertified By _____ Date: 12/13/2006 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/10/07

RECORD COPY

Tracer Solution for Environmental Analysis & Disequilibrium Studies

Product Description & Measurement Certificate

Description	Principal radionuclide:	**uranium 232 (U-232)**	Product code: **UDP10050**
	Daughter Nuclide:	Th-228	Batch Number: 92/232/67
Measurement	Reference date:		01 March 2000
	Radioactive concentration U-232		6.739E+03 becquerels per gram of solution
	which is equivalent to		1.821E-01 microcuries per gram of solution
	Mass of solution		5.35€ grams
	Volume of solution		5.035 millilitres
	Total activity of U-232		3.61E+04 becquerels
	which is equivalent to		9.76E-01 microcuries

Accuracy

Method of measurement (see reverse of this certificate)
Random uncertainty is: ± 0.7% Systematic uncertainty: ± 0.5%
Overall uncertainty in the radioactive concentration quoted above: ± 1.7%
Overall uncertainty is defined on the reverse of this certificate.

Radionuclidic Purity

Any radioactive impurities measured are listed below, expressed as percentages of the activity of the principle radionuclide at the reference date .

Th-228 and daughter activity removed 2 Feb 2000
U-232 daughters activity will increase with time. By alpha 88% U-232, 12% daughters on 1/3/00

Isotopic Purity

The isotopic composition, expressed as atom per cent at the reference date .

Not measured

Chemical Composition

Calculated weight of U-232, 4.42E-08 grams, as 2M HNO3 solution in a flame sealed glass vial.
This Tracer solution has been produced 'carrier free'.

Physical Data

Recommended half life of uranium 232: 6.980E+01 years
Principle energies of alpha emissions (MeV): 5.263 31.7%, 5.320 68.0%
Branching ratio for alpha emission: 100%
Calculated specific activity of uranium 232: 8.167E+05 Bq per microgram U-232.

Remarks

For safety information and notes to ensure correct usage by all persons handling this radioactive Tracer solution please read the instructions accompanying the package.

AEA Technology operates a quality management system which has been independently audited and approved to ISO 9001.

Approved Signatory

Roger Wiltshire

Project Ref. AE2315

Prepared and characterised in the UK, for world wide distribution by **Isotrak, AEA Technology, QSA.**

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 11/01/03

Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 12/14/2006 0:00

SOLUTION REFERENCE #: AEA/Amersham 92/232/67 | SOLUTION #: U-10

Principal Radionuclide	Half Life, Years	Half Life, Days
^{232}U	7.200E+01	2.630E+04

Radionuclide: ^{232}U

Reference Date: 3/1/2000 0:00

Certified Activity: 9.760E-01 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross: Weight, Grams

Empty Ampoule: Weight, Grams

Solution Net: Weight, Grams

Total Activity in Ampoule: 0.9760 µCi

Chemical Composition of Standard Solution

$^{232}U(NO_3)_6$ in 2M HNO_3

Dilution Instructions:

Dilution Solvent Used: 2M HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.9760 µCi Which Equals 2.167E+06 dpm at the date listed above

And after dilution the activity of this solution is 2.167E+03 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 14, 2007

Recertified By _____ Date: 12/14/2006 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/11/07

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.6; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

MP-009

Solution Reference #: AEA/Amersham 92/232/67
Date: 12/14/2006 0:00
Solution #: U-10a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{232}U	7.200E+01	2.630E+04

Radionuclide of Interest: ^{232}U
Parent Solution Conc.: 2.167E+03 dpm/ml
Reference Date: 3/1/2000 0:00

Chemical Composition of Standard Solution
$^{232}U(NO_3)_6$ in 2M HNO_3

Dilution Instructions:
Dilution Solvent Used: 2M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 10.0000 ml
Total Activity: 2.1670E+04 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 2.1670E+01 dpm/ml

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 14, 2007

Recertified By _____ Date: 12/14/2006 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/11/07

QA/QC REVIEWED
Date 10/14/91 lut 10/14/91 Initials lut

Received
OCT 14 1991
TMA/Eberline
Oak Ridge Lab

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Radionuclide	Th-230	Customer:	TMA EBERLINE
Half Life:	(7.54 ± 0.03) x 10^4 years	P.O.No.:	TT4944
Catalog No.:	7230	Reference Date:	November 1 1991 12:00 PST.
Source No.:	388-116	Contained Radioactivity:	1.036 µCi.

Description of Solution

a. Mass of solution:	5.0042	grams.
b. Chemical form:	Th(NO3)4 in 0.1N HNO3	
c. Carrier content:	None added	
d. Density:	1.0016	gram/ml @ 20°C.

Radioimpurities

See attached technical data sheet

Radioactive Daughters

See attached technical data sheet

Radionuclide Concentration

0.207 µCi/gram.

Method of Calibration

Weighed aliquots of the solution were assayed using a liquid scintillation counter.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±2.0%
b. Random uncertainty in assay:	±0.5%
c. Random uncertainty in weighing(s):	±0.2%
d. Total uncertainty at the 99% confidence level:	±2.7%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Notes

1. Nuclear data were taken from "Table of Isotopes", Seventh Edition, edited by Virginia S. Shirley.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay(and later NIST certification) of Standard Reference Materials. (As in NRC Regulatory Guide 4.15)

QUALITY CONTROL

ISOTOPE PRODUCTS LABORATORIES
1800 No. Keystone Street.,
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QUALITY CONTROL PROGRAM

MP-009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 12/30/2006 0:00

SOLUTION REFERENCE #: IPL 388-116 | SOLUTION #: Th-1

Principal Radionuclide	Half Life, Years	Half Life, Days
^{230}Th	7.540E+04	2.754E+07

Radionuclide: ^{230}Thorium
Reference Date: 11/1/1991 0:00
Certified Activity: 1.036E+00 µCi
Certified Concentration: µCi per gram

Ampoule /Solution Gross	9.2660	Weight, Grams
Empty Ampoule	4.6218	Weight, Grams
Solution Net	4.6442	Weight, Grams
Total Activity in Ampoule	1.0360	µCi

Chemical Composition of Standard Solution

$^{230}Th(NO_3)_4$ in 0.1N HNO_3

Dilution Instructions:

Dilution Solvent Used: 0.1N HNO_3

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0360 µCi Which Equals 2.300E+06 dpm at the date listed above

And after dilution the activity of this solution is 2.300E+03 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 30, 2007

Recertified By _____ Date: 12/30/2006 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/10/07

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

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Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP-009	Date	12/30/2006 0:00
Solution Reference #	IPL 388-116	Solution #	Th-1b

Principal Radionuclide	Half Life, Years	Half Life, Days
^{230}Th	7.540E+04	2.754E+07

Radionuclide of Interest	^{230}Thorium	Reference Date	11/1/1991 0:00
Parent Solution Conc.	2.30E+03 dpm/ml		

Chemical Composition of Standard Solution
$^{230}Th(NO_3)_4$ in 0.1N HNO_3

Dilution Instructions:

Dilution Solvent Used 0.1N HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	10.0000 ml		
Total Activity:	2.2999E+04 dpm	Final Activity Concentration:	2.2999E+01 dpm/ml
Final Volume:	1000.00 ml		

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 30, 2007

Recertified By _____ Date: 12/30/2006 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/10/07

Th-8

CERTIFICATE OF CALIBRATION - ALPHA STANDARD SOLUTION

Radionuclide:	Th-232	Customer:	TMA EBERLINE
Half Life:	(1.405± 0.006) x 10^10 years	P.O.No.:	VH1632
Catalog No.:	7232	Reference Date:	November 1 1993 12:00 PST.
Source No.:	435-104-2	Contained Radioactivity:	(Th-232) 0.0933 µCi.
		Contained Radioactivity:	(Th-232) 3.45 kBq.

Description of Solution

a. Mass of solution:	11.9712 g (in a 10 ml flame sealed ampoule)
b. Chemical form:	Th(NO3)4 in water
c. Carrier content:	None added
d. Density:	Approx. 1.21 g/ml @ 20°C.

Radioimpurities: None detected (other than daughters).

Radioactive Daughters

Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Po-212, Tl-208

Radionuclide Concentration

(Th-232) 0.00779 µCi/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±3.0%
b. Random uncertainty in assay:	±0.0%
c. Random uncertainty in weighing(s):	±2.0%
d. Total uncertainty at the 99% confidence level:	±3.6%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

See reverse side for Leak Test(s) applied to this source.

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

Anna U. Rua
QUALITY CONTROL

NOV. 8, 1993
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
Burbank, California 91504
(818) 843 - 7000

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QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 12/14/2006 0:00

SOLUTION REFERENCE #: IPL 435-104-2 | SOLUTION #: Th-8

Principal Radionuclide	Half Life, Years	Half Life, Days
^{232}Th, ^{228}Th	1.405E+10	5.132E+12

Radionuclide: $^{232\ \&\ 228}Th$
Reference Date: 11/1/1993 0:00
Certified Activity: 9.330E-02 µCi
Certified Concentration: µCi per gram

Ampoule /Solution Gross	18.8415	Weight, Grams
Empty Ampoule	6.9296	Weight, Grams
Solution Net	11.9119	Weight, Grams
Total Activity in Ampoule	0.0933	µCi

Chemical Composition of Standard Solution

$Th(NO_3)_4$ in H2O

Dilution Instructions:

Dilution Solvent Used: 1% Nitric Acid

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.0933 µCi Which Equals 2.071E+05 dpm at the date listed above

And after dilution the activity of this solution is 2.071E+02 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 14, 2007

Recertified By _____ Date: 12/14/2006 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/11/07

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QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP-009	Date	12/14/2006 0:00
Solution Reference #	IPL 435-104-2	Solution #	Th-8b

Principal Radionuclide	Half Life, Years	Half Life, Days
$^{228\ \&\ 232}$Th	1.405E+10	5.132E+12

Radionuclide of Interest	$^{228\ \&\ 232}$Th	Reference Date	11/1/1993 0:00
Parent Solution Conc.	2.07E+02 dpm/ml		

Chemical Composition of Standard Solution

$Th(NO_3)_4$ in 1% HNO_3

Dilution Instructions: **Dilution Solvent Used** 1% Nitric Acid

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	500.0000 ml		
Total Activity:	1.0355E+05 dpm	Final Activity Concentration:	1.0355E+02 dpm/ml
Final Volume:	1000.00 ml		

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 14, 2006

Recertified By _____ Date: 12/14/2006 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/11/07

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

Th-18

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Radionuclide:	Th-229	**Customer:**	EBERLINE SERVICES
Half-life:	7340 ± 160 years	**P.O. No.:**	00009633
Catalog No.:	7229	**Reference Date:**	15-Jan-02 12:00 PST
Source No.:	867-54	**Contained Radioactivity: (Th-229 only)**	1.013 µCi 37.48 kBq

Physical Description:

A. Mass of solution:	5.0147 g in 5 mL flame-sealed ampoule
B. Chemical form:	$Th(NO_3)_4$ in 0.1M HNO_3
C. Carrier content:	10µg Th/mL
D. Density:	1.0016 g/mL @ 20°C.

Radioimpurities:

None detected (daughters in equilibrium)

Radionuclide Concentration: 0.2020 µCi/g, 7.474 kBq/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in µCi/g was determined using gamma ray spectrometry.

Peak energy used for integration:	193.5 keV
Branching ratio used:	0.0441 gammas per decay

Uncertainty of Measurement:

A. Type A (random) uncertainty:	± 0.7 %
B. Type B (systematic) uncertainty:	± 3.0 %
C. Uncertainty in aliquot weighing:	± 0.0 %
D. Total uncertainty at the 99% confidence level:	± 3.1 %

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
- Nuclear data was taken from IAEA Technical Report Series No. 261.
- This solution has a working life of 5 years.

[signature] — Quality Control

9-Jan-02 — Date Signed

IPL Ref. No.: 867-54

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 1/3/2007 0:00

SOLUTION REFERENCE #: IPL 867-54

SOLUTION #: Th-18

Principal Radionuclide	Half Life, Years	Half Life, Days
^{229}Th	7.340E+03	2.681E+06

Radionuclide: ^{229}Th

Reference Date: 1/15/2002 0:00

Certified Activity: 1.013E+00 µCi

Certified Concentration: µCi per gram

Ampoule /Solution Gross	8.7752	Weight, Grams
Empty Ampoule	3.7591	Weight, Grams
Solution Net	5.0161	Weight, Grams
Total Activity in Ampoule	1.0130	µCi

Chemical Composition of Standard Solution

$^{229}Th(NO_3)_4$ in 0.1M HNO_3

Dilution Instructions:

Dilution Solvent Used: 0.1 M HNO_3

Dilute to a volume of: 1000.00 milliliters

Certified Total Activity of: 1.0130 µCi Which Equals: 2.249E+06 dpm at the date listed above

And after dilution the activity of this solution is: 2.249E+03 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: January 3, 2008

Recertified By _____ Date: 1/3/2007 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/10/07

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.7; 9/29/99
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP-009	Date	1/3/2007 0:00
Solution Reference #	IPL 867-54	Solution #	Th-18a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{229}Th	7.340E+03	2.681E+06

Radionuclide of Interest	^{228}Th	Reference Date	1/15/2002 0:00
Parent Solution Conc.	2.25E+03 dpm/ml		

Chemical Composition of Standard Solution
$TH(NO_3)_4$ in 0.1M HNO_3

Dilution Instructions: **Dilution Solvent Used** 0.1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	10.0000 ml	Final Activity Concentration:	2.2490E+01 dpm/ml
Total Activity:	2.2490E+04 dpm		
Final Volume:	1000.00 ml		

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: January 3, 2008

Recertified By _____ Date: 1/3/2007 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/10/07

Ba-6
(# 6a)

National Institute of Standards & Technology

Certificate

Standard Reference Material 4251C
Barium-133 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive barium-133 chloride, non-radioactive barium chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of ionization chambers and solid-state gamma-ray spectrometry systems.

Radiological Hazard

The SRM ampoule contains barium-133 with a total activity of approximately 2.5 MBq. Barium-133 decays by electron capture and during the decay process X-rays and gamma rays with energies from 4 to 400 keV are emitted. Most of these photons escape from the SRM ampoule and can represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. Appropriate shielding and/or distance should be used to minimize personnel exposure. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least June 2004.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group and D.B. Golas, Nuclear Energy Institute Research Associate.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program

*Notes and references are on pages 5 and 6.

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

QCP-009

Rev.8; 11/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
QCP 009-1

CURRENT DATE: 11/6/2006 0:00

SOLUTION REFERENCE #: NIST SRM4251C

SOLUTION #: Ba-6

Principal Radionuclide	Half Life, Years	Half Life, Days
^{133}Barium	1.048E+01	3.828E+03

Radionuclide: ^{133}Barium

Reference Date: 9/1/1993 0:00

Certified Activity: µCi

Certified Concentration: 1.318E+01 µCi per gram

Ampoule /Solution Gross	9.3081	Weight, Grams
Empty Ampoule	4.2582	Weight, Grams
Solution Net	5.0499	Weight, Grams
Total Activity in Ampoule	66.5577	µCi

Chemical Composition of Standard Solution

$^{133}BaCl_2$ in 1M HCl

Dilution Instructions:

Dilution Solvent Used: 1M HCl

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 66.5577 µCi Which Equals 1.478E+08 dpm at the date listed above

And after dilution the activity of this solution is 1.478E+05 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: November 6, 2007

Recertified By _____ Date: 11/18/06

Verified & Approved By _____ Date: 11/27/06

QC Approval _____ Date: 11/27/06

EBERLINE SERVICES

QUALITY CONTROL PROGRAM
QCP-009

Rev.8; 11/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	QCP-009-1-A	Date	11/6/06
Solution Reference #	NIST SRM4251C	Solution #	Ba-6a

Principal Radionuclide	Half Life, Years	Half Life, Days
^{133}Ba	1.048E+01	3.828E+03

Radionuclide of Interest	^{133}Ba	Reference Date	9/1/1993 0:00
Parent Solution Conc.	1.48E+05 dpm/ml		

Chemical Composition of Standard Solution
$^{133}BaCl_2$ in 1M HCl

Dilution Instructions: **Dilution Solvent Used** 1M HCl

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	25.0000 ml	Final Activity Concentration:	3.6950E+03 dpm/ml
Total Activity:	3.6950E+06 dpm		
Final Volume:	1000.00 ml		

NOTES:

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: November 6, 2007

Recertified By _____ Date: 11/18/06

Verified & Approved By _____ Date: 11/27/06

QC Approval _____ Date: 11/27/06

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Ra-5

QA/QC REVIEWED
Date 2/8/94 Initials MT

Radionuclide:	Ra-226	Customer:	TMA EBERLINE
Half Life:	1600 ± 7 years	P.O.No.:	VH1888
Catalog No.:	7226	Reference Date:	February 1 1994 12:00 PST.
Source No.:	453-26	Contained Radioactivity: (Ra-226)	1.001 μCi.
		Contained Radioactivity: (Ra-226)	37.0 kBq.

Description of Solution

a. Mass of solution:	5.1864 g (in a 5 ml Flame Sealed Ampoule)
b. Chemical form:	Ra(NO3)2 in 1 N HNO3
c. Carrier content:	None added
d. Density:	1.0318 g/ml @ 20°C.

Radioimpurities: None detected(other than daughters)

Radioactive Daughters
Rn-222, Po-218, At-218, Pb-214, Bi-214, Po-214, Tl-210, Pb-210, Bi-210, Po-210 and Tl-206.

Radionuclide Concentration
(Ra-226) 0.1929 μCi/g.

Method of Calibration

Weighed aliquots of the solution were assayed using gamma spectrometry:
Energy peak(s) integrated under: 186 keV.
Branching ratio(s) used: 0.0351 gamma rays per decay.

Uncertainty of Measurement

a. Systematic uncertainty in instrument calibration:	±3.4%
b. Random uncertainty in assay:	±3.1%
c. Random uncertainty in weighing(s):	±0.2%
d. Total uncertainty at the 99% confidence level:	±4.6%

NIST Traceability

This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

See reverse side for Leak Test(s) applied to this source.

Notes

1. Nuclear data were taken from "Table of Radioactive Isotopes", edited by Virginia S. Shirley, 1986.
2. IPL participates in an NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).

Ann U. Kuen
QUALITY CONTROL

Feb. 3, 1994
Date Signed

ISOTOPE PRODUCTS LABORATORIES
1800 North Keystone Street
Burbank, California 91504
(818) 843 - 7000

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP 009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

CURRENT DATE: 12/29/2006 0:00

SOLUTION REFERENCE #: IPL 453-26 | SOLUTION #: Ra-5

Principal Radionuclide	Half Life, Years	Half Life, Days
^{226}Radium	1.600E+03	5.844E+05

Radionuclide: ^{226}Radium
Reference Date: 2/1/1994 0:00
Certified Activity: 1.001E+00 µCi
Certified Concentration: µCi per gram

Ampoule /Solution Gross: Weight, Grams
Empty Ampoule: Weight, Grams
Solution Net: Weight, Grams
Total Activity in Ampoule: 1.0010 µCi

Chemical Composition of Standard Solution
$^{226}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions:

Dilution Solvent Used: 1M HNO_3

Dilute to a volume of: 1000.00 milliliters

Certified Total Activity of: 1.0010 µCi Which Equals: 2.222E+06 dpm at the date listed above

And after dilution the activity of this solution is: 2.222E+03 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 29, 2007

Diluted By: _____ Date: 12/29/2006

Verified & Approved By: _____ Date: 1/9/07

QC Approval: _____ Date: 1/11/07

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP 009

Rev.8; 11/01/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

	MP 009	Date	12/29/2006 0:00
Solution Reference #	IPL-453-26	Solution #	Ra-5b

Principal Radionuclide	Half Life, Years	Half Life, Days
^{228}Radium	1.600E+03	5.844E+05

Radionuclide of Interest: ^{228}Radium
Parent Solution Conc.: 2.22E+03 dpm/ml

Reference Date: 2/1/1994 0:00

Chemical Composition of Standard Solution
$^{228}Ra(NO_3)_2$ in 1M HNO_3

Dilution Instructions:

Dilution Solvent Used: 1M HNO_3

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 20.0000 ml
Total Activity: 4.4440E+04 dpm
Final Volume: 1000.00 ml

Final Activity Concentration: 4.4440E+01 dpm/ml
This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

NOTES:

Expiration Date: December 29, 2007

Recertified By _____ Date: 1/4/2007 CDR

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/11/07

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

61680-416

Ra-228 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated using a germanium gamma spectrometer system.

Radionuclide purity and calibration were checked using a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

ISOTOPE:	Ra-228
ACTIVITY (dps):	3.586 E3
HALF-LIFE:	5.75 years
CALIBRATION DATE:	June 4, 2001 12:00 EST
TOTAL UNCERTAINTY*:	5.1%
SYSTEMATIC:	3.6%
RANDOM:	1.5%

*99% Confidence Level

Impurities: γ-impurities (other than decay products) <0.1%

5.00872 grams 0.1M HCl solution with 50 µg/g Ba carrier.

P O NUMBER 00008864, Item 1

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: ACMcA 6/8/01

EBERLINE SERVICES

QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

EBERLINE SERVICES - OAK RIDGE LABORATORY
RADIOACTIVE REFERENCE SOLUTIONS
PRIMARY DILUTION RECERTIFICATION
MP 009

		CURRENT DATE	12/29/2006 0:00
SOLUTION REFERENCE #	Analytics 61680-416	SOLUTION #	Ra-10

Principal Radionuclide	Half Life, Years	Half Life, Days
^{228}Ra	5.750E+00	2.100E+03

Radionuclide	^{228}Ra	
Certified Activity	9.692E-02	µCi
Certified Concentration		µCi per gram

Reference Date: 6/4/2001 0:00

Ampoule /Solution Gross	9.4982	Weight, Grams
Empty Ampoule	4.4895	Weight, Grams
Solution Net	5.0087	Weight, Grams
Total Activity in Ampoule	0.0969	µCi

Chemical Composition of Standard Solution

$^{228}Ra(NO_3)_2$ in 0.5 M HCl

Dilution Instructions:

Dilution Solvent Used: 0.5 M HCl

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.0969 µCi Which Equals 2.152E+05 dpm at the date listed above

And after dilution the activity of this solution is 2.152E+02 dpm/ml

This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 29, 2007

Recertified By _____ Date: 12/29/2006 0:00

Verified & Approved By _____ Date: 1/9/07

QC Approval _____ Date: 1/10/07